DIVISION OF ENVIRONMENTAL HEALTH AND COMMUNICABLE DISEASE PREVENTION

Office of Surveillance

Annual Report

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INTRODUCTION

Since 1997 the Office of Surveillance (OoS) has been responsible for the development and continuous quality improvement of an integrated statewide surveillance system for communicable, zoonotic, and environmentally induced health threats. This is accomplished with the collaboration of health partners from all fields in the pursuit of accurate public health data collection and storage. This effort provides for early identification of health threats, which maximizes the efforts of early prevention.

This report contains information about reportable diseases and conditions, as well as items of public health interest reported in 2002 to the OoS and other sections within the Division of Environmental Health and Communicable Disease Prevention (EHCDP) of the Missouri Department of Health and Senior Services (DHSS). Information about the annual cases of specific diseases is presented as part of a detailed demographic profile or simple descriptions of disease by month of report and the associated five-year median, lower quartile (first quartile) and upper quartile (third quartile). The median, or second quartile, is the value that is the middle of variance for the cases. Each quartile is worth 25%. These ranges for this five-year median are based on the calendar years 1997 through 2001. Additional information about these conditions is available through the hyperlinks in this document and the Department of Health and Senior Services web site (www.dhss.mo.gov).

Note from the Administrator of the Office of Surveillance

This is the first year that the OoS has produced a comprehensive annual report. Many of the mandated reportable diseases and conditions are highlighted here. Diseases with unusual occurrence are noted along with an explanation.

The idea for this report came from an OoS Epidemiology Specialist, Michael Fobbs. His persistence, as well as the work of many others in the OoS, have resulted in this report. A special thanks goes to Lora Cable who spent hours formatting the document.

We invite your questions and comments on this report. We can be reached by phone at (573) 751-9071 or Toll- free (866) 628-9891, by Fax at (573) 751-6417, or email lyn.konstant@dhss.mo.gov. Put in subject line “2002 OoS Annual Report”.

Thank you for taking the time to read this report.

Lyn C. Konstant, Ph.D.
Administrator

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DEFINITIONS

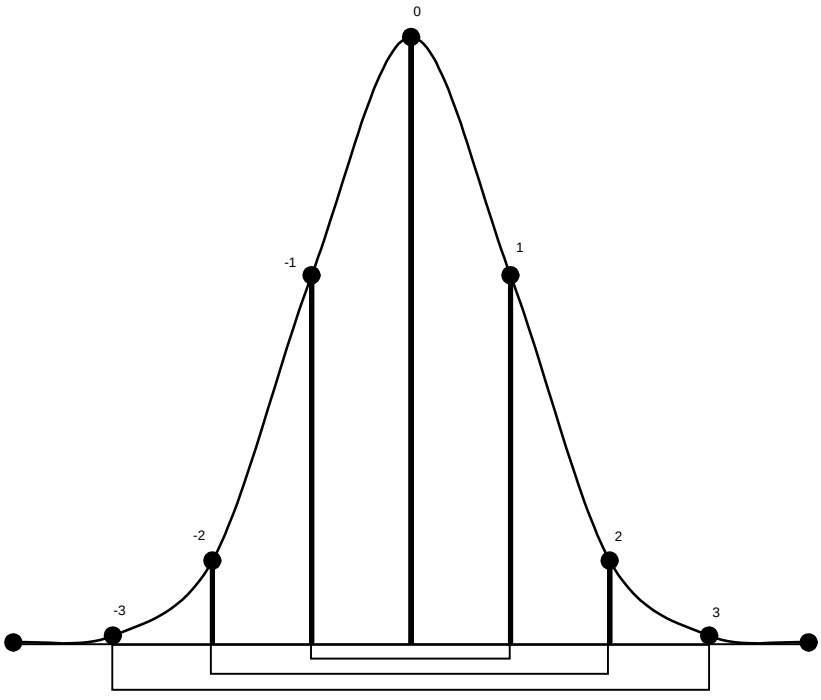
Measures of Central Tendency:

The three most often discussed measures of central tendencies are mean, median, and mode. Mean, commonly called average, is defined as the sum of the observations divided by the number of observations. Median is the point in a data set where half of the elements have a larger value and half of the elements have a lesser value. Mode is a term to describe the value that occurs most frequently. For examples of the calculations of each of these measures, Click Here

Measures of Variation:

The most common way to describe the range of variation is standard deviation (usually denoted by the Greek letter sigma **σ**). The standard deviation is the square root of variance. Variance is defined as the sum of the squares of the differences between each observed value and the mean. Other measures of variation include range and interquartile range. Range is the difference of the largest and smallest observed values. Interquartile range is the difference between the value that represents the 75^{th} percentile and the 25^{th} percentile. For examples of calculation of measure of variation Click Here

Graph 1: Bell-Shaped Curve



Statistical Distributions

The **normal distributions** are a very important *class* of statistical distributions. All normal distributions are symmetric and have bell-shaped density curves with a single peak.

All normal density curves satisfy the following property which is often referred to as the *Empirical Rule*.

68% of the observations fall within **1 standard deviation** of the **mean.**

95% of the observations fall within **2 standard deviations** of the **mean**.

99.7% of the observations fall within **3 standard deviations** of the **mean.**

Thus, for a normal distribution, almost all values lie within **3 standard deviations** of the mean. (**See Graph 1)**.

Section A: Bio-Terrorism

The mission of bio-terrorism surveillance is to detect trends and aberrations to determine the scope and magnitude of bio-terrorist events and public health threats throughout the state so that timely interventions may be initiated to minimize their impact and save lives.

Biological and chemical agents used for terrorism is not a new concept, although the mass media attention to it may well be. There has not been a generation as far back as the Greeks (which is the first documented record of their use) that has not been effected by it. It is now believed that the plague that ravaged Europe, killing 20 million people, was initiated by the Tartars' catapulting bodies infected with the plague into enemy strongholds to wipe them out; the disease stampeded out of control. Of course we all know how smallpox was used on the Native American Indians to wipe out tribes that refused to surrender their land and property, but many people are unaware that in the late 1980's Americans used Salmonella on other Americans in a similar manner to try to influence an election in Oregon.

While the horrific events of September 11, 2001, shocked and scarred the nation, it was the bio-terrorist attacks that followed that revitalized our country's belief in the need for bio-terrorism surveillance, defense and emergency response; as an anthrax-covered envelope could make its way into anyone's home or place of business. In October 2001, Missouri's Department of Health and Senior Services (DHSS) created a syndromic surveillance system, the High Alert Surveillance System (HASS), making Missouri the first and only state to create and implement a statewide bio-terrorism surveillance system; a solitary honor we retained until May of 2003.

Even with the events of September 11, 2001 many other states waited to start investing resources in Bio-Terrorism Surveillance (BTS) until they received specific direction from the Centers for Disease Control and Prevention (CDC). This guidance did not become available until September 23-24, 2002, when at the National Syndromic Surveillance Conference in New York City the CDC mandated that Bio-Terrorism Syndromic Surveillance systems be implemented in each state. The CDC based this edict on the systems that had already been up and operational for many years within our military branches, such as the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) which uses chief complaints, syndromes and ICD-9 codes to conduct syndromic surveillance on all military personnel; the Rapidly Deployable Surveillance System (RDSS), which uses similar methodologies, but deals specifically with Navy personnel; and new and experimental systems that mimicked them, such as Missouri's HASS and Pittsburgh's RODS (Real-time Outbreak and Disease Surveillance).

This new edict caused a quandary for many states who did not have experience with bio-terrorism surveillance, others who needed their health resources for their established health programs, and some who just did not believe that this was the best way to approach or conduct bio-terrorism surveillance. Syndromic surveillance systems monitor disease trends by grouping cases into syndromes rather than specific diagnoses. U.S. state and local health departments are developing and implementing such systems in hopes of reducing the impact of bioterrorism attacks through earlier detection and action than is possible with traditional diagnosis-based surveillance. The rationale for this approach is that the organisms identified by the CDC as high priority potential bioterrorism agents cause diseases that are rare, often misdiagnosed initially, and can have overlapping clinical presentations. Syndromic surveillance systems may also have secondary benefits, including better disease monitoring after an attack and more rapid detection of naturally occurring outbreaks.

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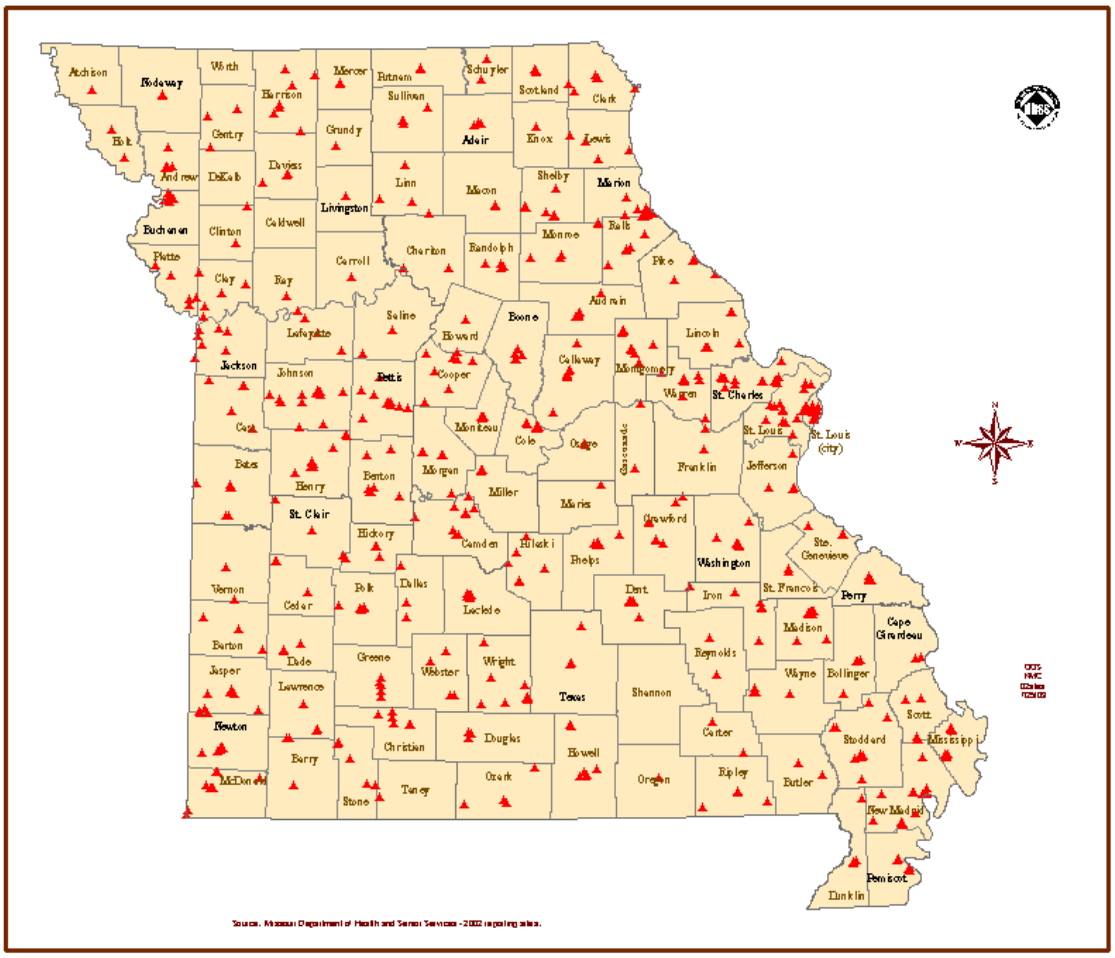
Figure 1A: Missouri Bio-Terrorism Surveillance (BTS) - 2002 Reporting Sites



Missouri's HASS was based on syndromic categories derived from the CDC in an effort to promote awareness and education of the threat of bio-terrorism and public health emergencies and participation in both active and passive surveillance statewide to hospitals, emergency rooms, outpatient facilities, physicians, schools and other reporting sites of strategic significance. By the time other states were beginning to start-up their bio-terrorism surveillance system, Missouri had evaluated its own system and started working on changing and improving it to increase the amount, quality and reliability of information gained. One successful example of syndromic surveillance in 2002 was the addition of Influenza-like illness (ILI) in preparation for pandemic flu so that we may compare non–sentinel data with our ILI sentinel surveillance system.

The DHSS Office of Surveillance worked with local public health agencies to recruit hospitals, physicians, schools, daycare centers and long-term care facilities across the state to participate in bio-terrorism surveillance by reporting syndromic data through HASS every day **(See Figure 1A)**. The HASS database compiled the data collected to detect any aberrations in frequency, incidence or prevalence at state, district, county and even individual site levels. Using standard deviations, site averages, and geographical information systems, DHSS's BTS team analyzed the data submitted and returned monthly summary reports to its stakeholders and participants showing not only the specific site data but also how they compared with what was reported statewide.

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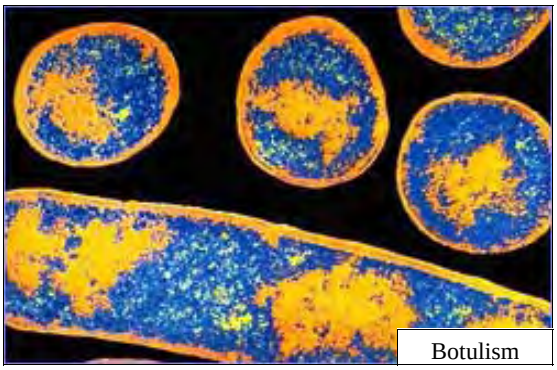
The Office of Surveillance (OoS) and our many partners, inside and outside DHSS, investigate each incident that flags as an aberration or is identified as a trend of some importance to public health. This initiates a phone call to the sites or Local Public Health Agencies (LPHA) asking for further detail, personal observances or sometimes just as a heads up on something that might not seem like an aberration from one site but when seen in relationship to the whole (the entire state) might be the beginning of a public health threat.



Botulism

Internally, we work hand in hand with DHSS's Hazardous Substances Emergency Events Surveillance (HSEES) Program, Section for Environmental Public Health (SEPH), Section for Communicable Disease Prevention (SCDP), and the Center for Emergency Response and Terrorism (CERT).

Externally, we collaborate with Missouri's local public health agencies, the HASS sites across the state, the CDC, the Missouri Hospital Association, departments of public health from surrounding states, first responders and the United States military.

The 927 follow-up phone calls made to sites and LPHAs by the Bio-Terrorism Surveillance Unit regarding reported elevations and aberrations yielded 58 cases involving 884 people/cases [including unreported communicable disease cases, emerging infections such as West Nile Virus (WNV), and gastrointestinal outbreaks] and 15 unreported HSEES events. All of these results were immediately forwarded to the CDC, Regional Epidemiology Specialists, HSEES program and other offices as appropriate for further investigation and follow up **(See Table 1A on page 9)**.

We recognize that there are distinctly different levels of surveillance and that the constant maintenance of our nation's high alert status can cause deterioration in the participation and observations of reporters involved. To avoid this, BTS uses a two-pronged defense. The first prong is an early warning system (pre-event) to discover suspicious trends and events. The second is an evaluation of the impact by discovering the scope and magnitude (post-event) so that the appropriate intervention and prevention measures may be implemented immediately.

In addition, the data gathered include a comprehensive look at any and all information that could possibly fall under the term "surveillance" and are evaluated using measures of importance, like heightening our levels of surveillance in correlation with the national threat alert levels (ORANGE and RED) and emerging diseases. We do this by increasing the frequency of contacts with the reporting sites, BT Epidemiology specialists, and our other partners in public health surveillance efforts, increasing the sensitivity levels of the flagging system used to detect aberrations and giving a closer scrutiny to the information received. For example, in July through September of 2002, several sites were flagged due to rash illness reported to HASS during heightened surveillance. Our follow- up calls revealed various adverse reactions to smallpox vaccinations administered to first responders and a few of their immediate contacts. This information was immediately forwarded to the appropriate agencies and personnel for further investigation, treatment and follow-up.

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Table 1A: Number of Bio-Terrorism Surveillance Follow-Up Calls Resulting in Cases Forwarded to CDC, Regional Epidemiology Specialist or Other Appropriate Office

Illness or Condition Reported	Number Reported	Number Discovered With Follow-up Phone Call	Comments
Carbon Monoxide	2	13	
Chicken Pox	7	21	Fifteen of these were from the same site.
Coxsackievirus	3	3	
Croup	2	2	
Gastrointestinal			
Nausea, vomiting & diarrhea	4	560	Four separate sites were involved: 1 with 34 ill, 1 with 46 ill, 1 with 30 ill and one with 450 ill. One school closing due to this ill-ness.
Nausea & vomiting	2	82	
Nausea, vomiting & fever	1	10	
Vomiting & diarrhea	1	23	
Hand, Foot & Mouth Disease	5	7	
Hemorrhagic Blisters	1	4	
Henoch-Schonlein Syndrome	1	1	
Hepatitis A	2	2	
Hepatitis C	3	3	
Influenza	1	Unknown	One school closing due to influenza-like illness.
Lyme Disease	1	1	
Malaria	1	1	
Meningitis	2	5	
Neurologic	1	65	All headaches
Norwalk-like Virus	1	48	
Powder in letter	1	1	
Salmonella	1	1	
STDs			
Chlamydia	1	1	
Gonorrhea	1	1	
Herpes	1	1	
Strep pneumoniae meningitis	1	1	
Strep Throat	1	14	Fourteen case from same site.
West Nile Virus	10	13	
Total	58		

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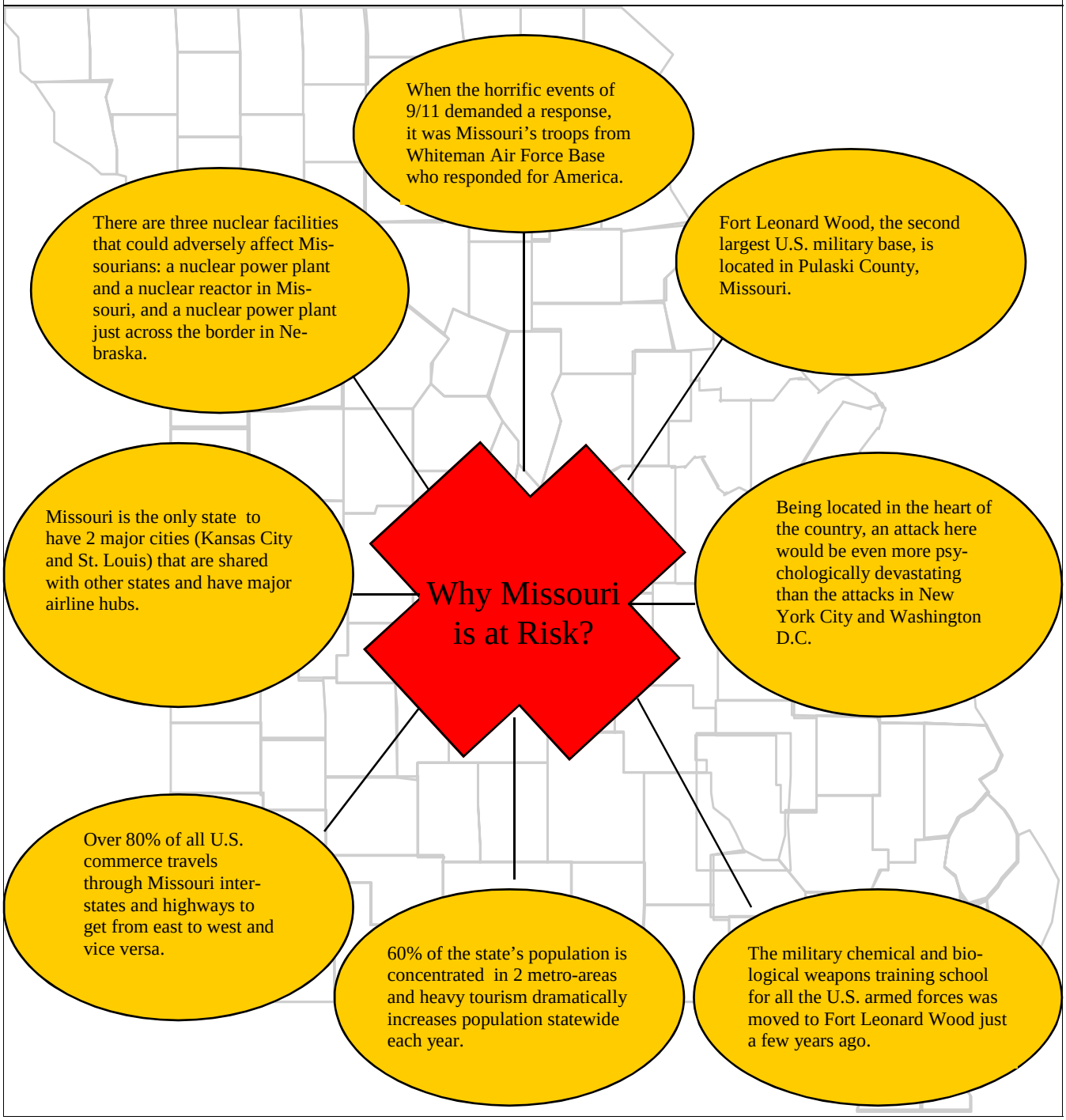
Figure 2A: Reasons for Bio-Terrorism Surveillance in Missouri



As you can see in **Figure 2A** above, Missouri is indeed a highly probable target for biological or chemical terrorist attack. The surest way to protect our communities, our country and ourselves is to realize that the threat is real, be as prepared as possible for any eventuality and be alert to any abnormalities as soon as they occur by being aware of what is normal for the location, time of season, endemic diseases and populations.

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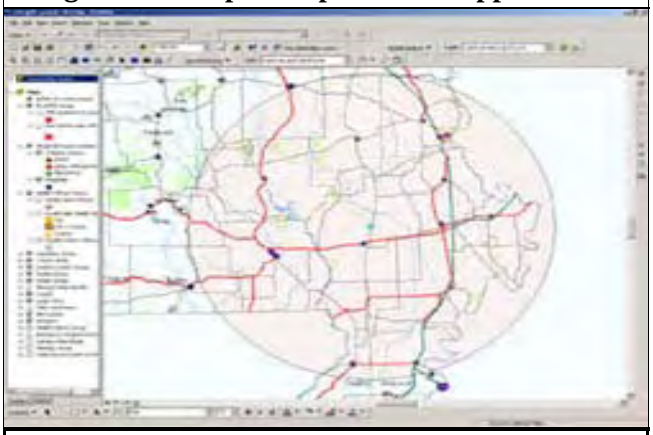
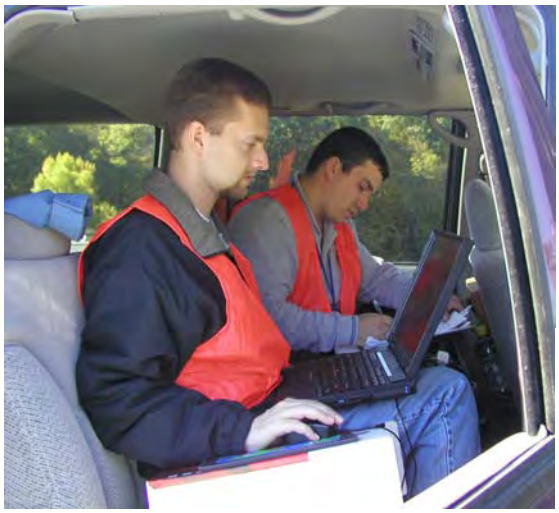
Figure 3A: Rapid Response GIS Applications



Over 100 datasets provide locational information during an emergency event.

2002 yielded many gains in BTS; historical data became available to compare season to season, Mondays to Mondays, and this year to last, all of which were previously unavailable. We also added the tracking and recording of flagging reports and follow up phone calls to query what had flagged in the past, how often and where. Geographic Information System (GIS) has been utilized so that physical locations, populations affected and areas to focus on could be pinpointed to help determine the scope and magnitude of various conditions reported.

It is important to realize that syndromic surveillance will never detect everything; it is not meant to. It is meant to provide an early warning of public health threats. However, BTS is a much broader view of what is occurring in our state and has become a vital element in protecting our communities from potential disease outbreaks, as well as from biological and chemical terrorism. GIS is a vital and necessary piece of BTS. By looking at information spatially, it is possible to quickly determine where incidents occur, who might be affected, what type of terrain or physical barriers may be encountered, where surveillance and intervention efforts might need to be directed, and when a clustering of symptoms or illnesses might be related, and therefore, would be of epidemiological concern.



GIS Mobile Response Team

The Missouri Emergency Response Geographic Information System (MERGIS) was created when DHSS was awarded a grant from CDC specifically for funding anti-Bio-Terrorist activities. The goal of MERGIS was to develop a simple but powerful and accurate mapping application for decision support and risk analysis, capable of portraying an emergency event in a near-real-time mode. The statewide emergency response GIS system uses existing data from many state agencies and other sources, with new data sets still needing to be acquired to enhance the system.

MERGIS was developed as a two-part application. It consists of a mobile response team for on-site GIS in an incident command center, and MERGISweb for desktop use. During an event, the response team may be sent on-site to meet with emergency response commanders. In the central office, GIS Control (GISC) is available for management decisions and overseeing data quality and the MERGISweb Internet application **(See Figure 4A on page 12)**.

MERGIS is a simple, portable, stand-alone GIS solution that can be dispatched quickly anywhere in the state. The application contains robust tools for spatial/temporal analysis, modeling and advanced cartography. A team of trained GIS staff will operate this system, reporting on-site to the Incident Commander. The primary function will be decision support and risk analysis in the immediate area of the event. On-site answers can be provided to questions such as “Which hospital can we re-route our injured to?” or “Where is the nearest source of potable water?”. Timely, detailed maps can also be provided to answer questions and clarify locations **(See Figure 3A)**. Data that are collected in an incident command center can then be transferred to the GISC, where it is made available to managers statewide through MERGISweb.

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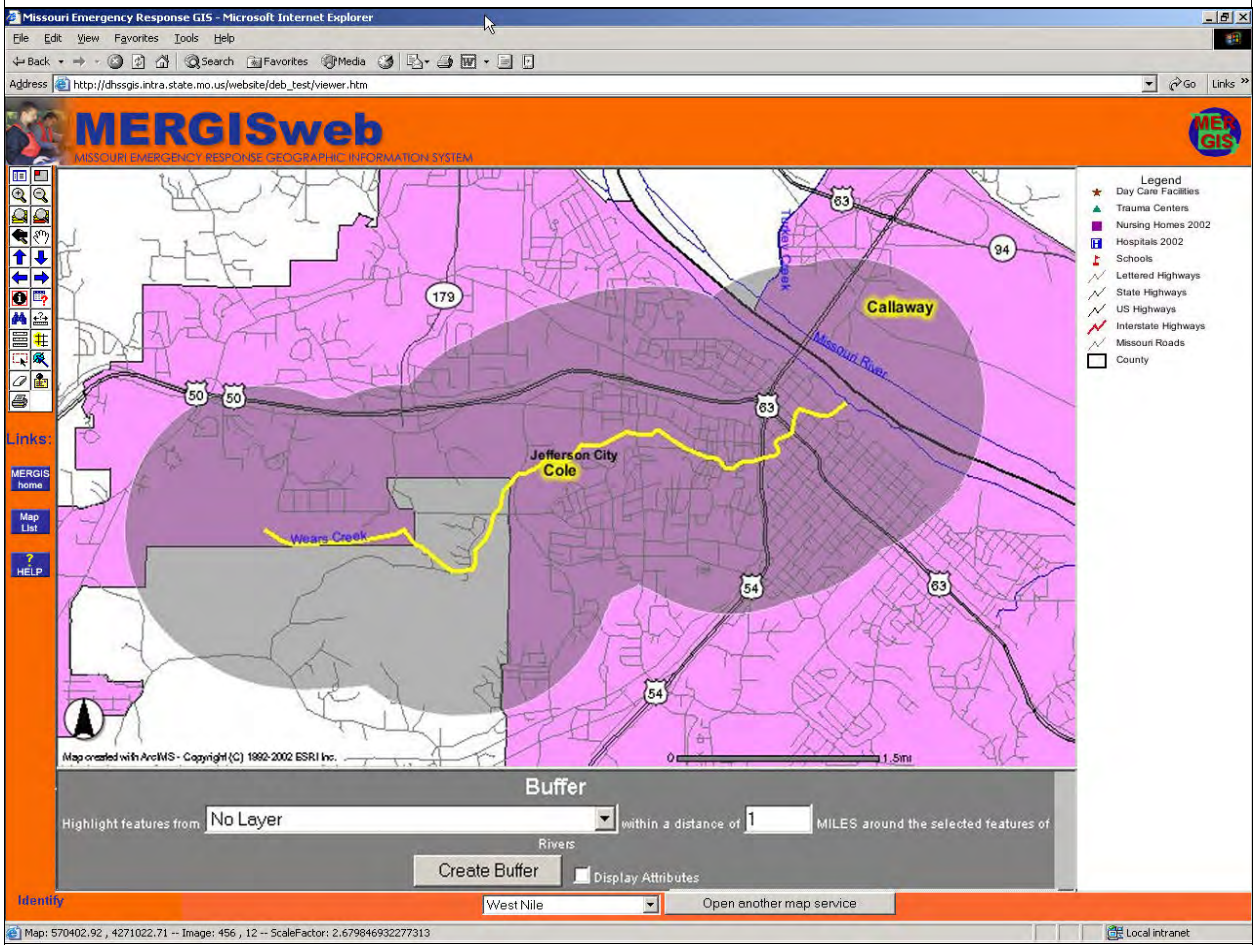
MERGISweb is a web-based counterpart to on-site GIS, which is an Internet Mapping Service application. This application allows emergency response managers easy access to MERGIS without leaving their offices. This customized, user-friendly interface helps ensure that a person with little or no GIS experience will be able to utilize GIS tools for their decision-making. This mapping tool will help managers to visualize facilities, terrain and local geography that field personnel will be seeing on-site. Analysis, such as buffering, querying, and measuring distances, can be performed from the manager's desktop.

With the gain of GIS capabilities, automated and/or electronic reporting, and with the continued cooperation of our partners, attaining real-time data collection is essential for successful BTS in the coming year. We continue to look for ways to improve and enhance Missouri's BTS with the hope that one day it will no longer be necessary.

Figure 4A: MERGISweb Internet Mapping Application



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Section B: Communicable Disease

Communicable Disease Surveillance

2002 was a busy year for communicable disease surveillance. Changes to 19 CSR 20-20.020, Reporting Communicable, Environmental, and Occupational Diseases, were promulgated to include certain diseases and other conditions of public health significance. The diseases and conditions added were: animal bites (non-human); West Nile Fever; West Nile Encephalitis; Coccidioidomycosis; *Streptococcus pneumoniae*, invasive disease in children less than five years old; vaccine-related adverse reactions to the smallpox immunization; and the separation of arboviral encephalitis/meningitis from a broad category to one that specifies each causative agent separately. These proposed additions to the rule became effective on July 1, 2003.

The disease data found in this report are incomplete, because not every instance of reportable disease or condition that occurred in the year 2002 has been identified and forwarded to the Missouri Department of Health and Senior Services (DHSS). However, our goal is to improve overall surveillance efforts, which include eliciting the assistance of those involved in communicable disease identification, treatment, and control. Increased vigilance to identify and report communicable diseases and reportable conditions by public health professionals would provide data that more accurately reflects morbidity in Missouri. To improve the accuracy of these data, we hope to encourage all disease reporters and health care providers to submit timely reports of reportable diseases and conditions to the DHSS in an expeditious manner.

This section is grouped by category and presented as foodborne/waterborne, sexually transmitted, vaccine preventable, and other communicable disease. Unusual incidence of disease did occur this year. Pertussis occurred at a level above the five-year median as well as the 3rd quartile. An alarming caveat within this increased morbidity was that infants (0 to 12 months) comprised almost half of Pertussis cases. Other diseases that occurred at greater-than-expected levels were Influenza, Hepatitis C, Chlamydia, Syphilis, Gonorrhea, Legionellosis, and Salmonellosis. Diseases that occurred at lower levels than expected were Tuberculosis, Aseptic Meningitis, Giardiasis, Hepatitis A, Hepatitis B, Meningococcal Disease, and Shigellosis. A table that reflects totals of selected reportable diseases by county for Missouri in 2002 has been included as a printable link and can be found at http://www.dhss.mo.gov/CommunicableDisease/CountyRATE.pdf.

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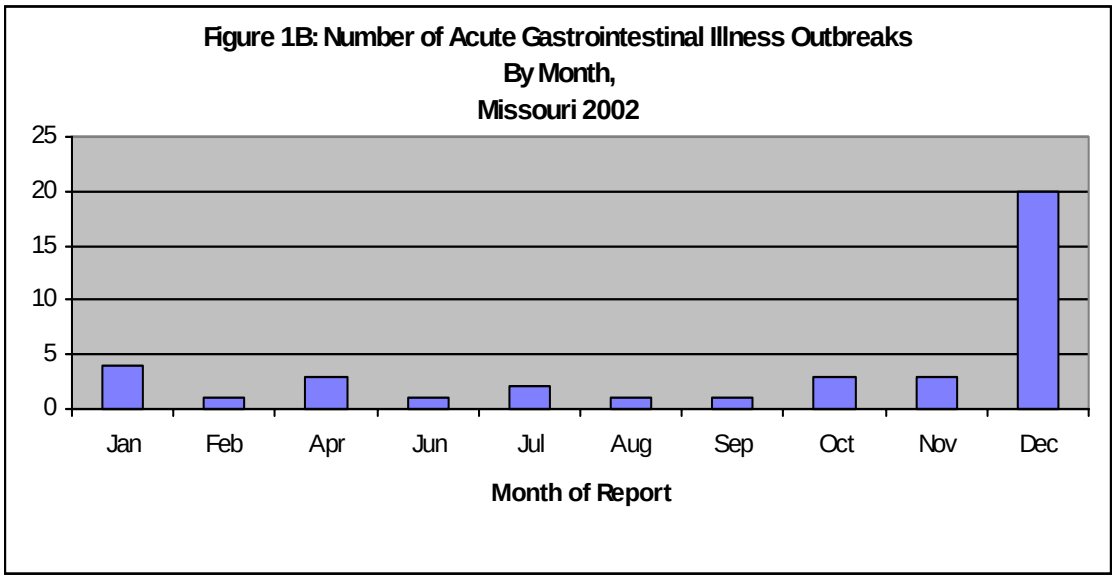
Acute Gastrointestinal Illness Outbreaks

Acute Gastrointestinal Illness (AGI) consists of gastrointestinal disease caused by many different agents such as bacteria, viruses and chemicals. Where these agents are identified and associated directly with food they are also designated as foodborne outbreaks or other types of outbreaks caused by a specific agent. Where the agents are not identified they are referred as AGI outbreaks of unknown etiology. In Missouri, outbreaks of disease, including AGI, are reportable; nationally, outbreaks of foodborne and waterborne disease are reportable.

In 2002, Missouri had 59 outbreaks of disease, 39 of these disease outbreaks were Acute Gastrointestinal Illness of unknown etiology, foodborne illness or diseases usually associated with foodborne illness. More than 2,108 people were made ill and more than 20,060 people were exposed in more than 13 different settings. The most common setting was school without specific mention of the cafeteria or meals prepared for school outings (14); places that either prepared or served food was the second most common setting (10); and childcare (5) was the next highest. The other 10 settings were events such as family gatherings, a military base, commercial transportation, a work place, a camp, a healthcare facility and the general community.

The majority of outbreaks were reported from October to December, whereas individual cases of gastrointestinal illness peak in the summer months **(See Figure 1B)**. Many of these diseases have a fecal-oral route of transmission and were reported as person-to-person transmission 20 times. Food was implicated as a mode of transmission 13 times. In the other six outbreaks, mode of transmission was unknown. Outbreaks occurred statewide, with 13 in the Eastern Region, 11 in the Central Region, 9 in the Northwest Region, 3 in the Southwest Region, 2 in the Southeast Region, and 1 in the Northeast Region. County rates, seen in **Figure 2B on page 15**, were calculated for AGI based on cases reported in the passive surveillance system for the most common agents of AGI in Missouri: Campylobacter; Cryptosporidium; *E. coli* O157:H7; Giardia; Hepatitis A; Listeria; Salmonella; Shigella; and *Yersinia enterocolitica*.



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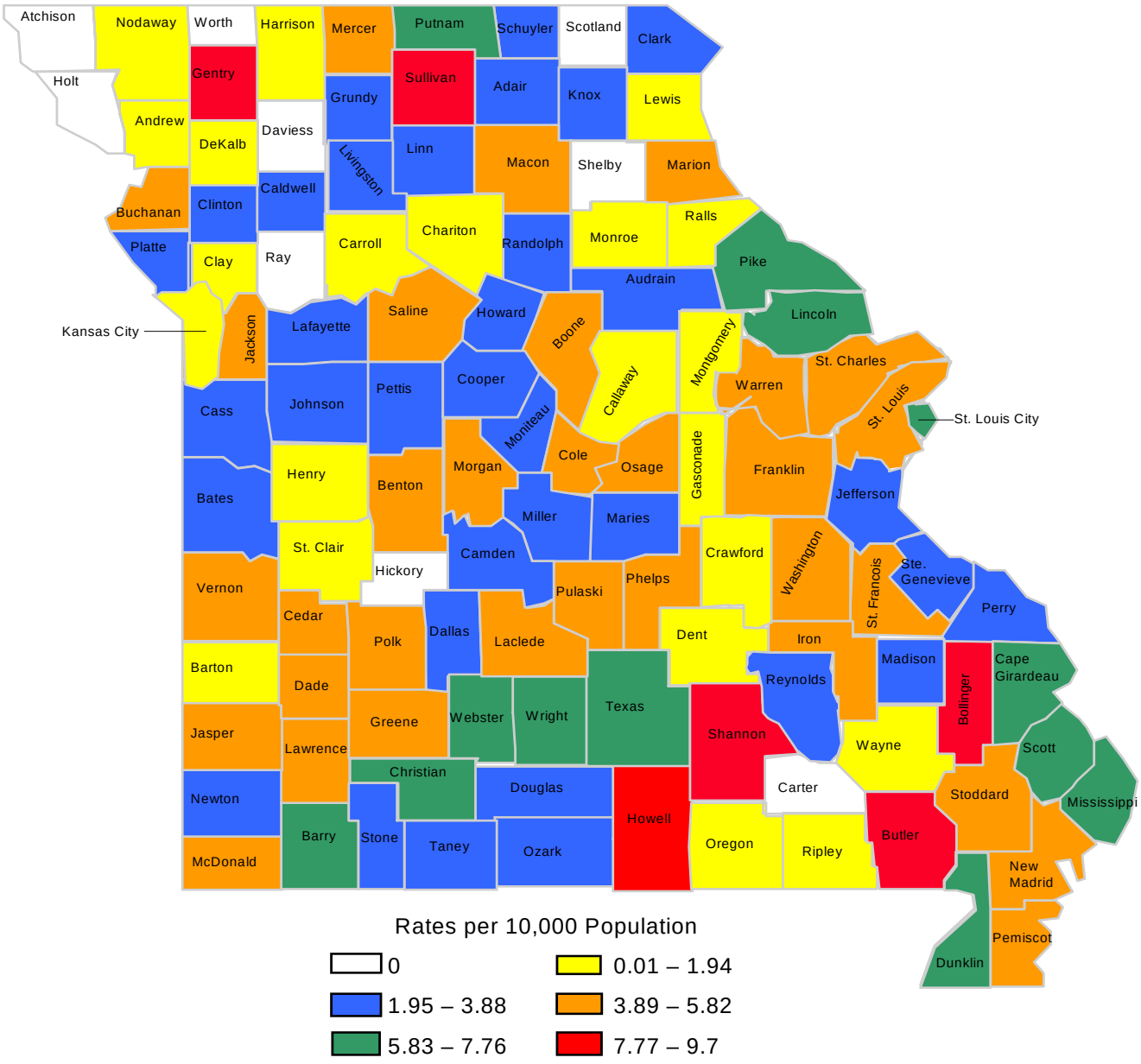
CD: Foodborne/Waterborne

Figure 2B: Acute Gastrointestinal Illness

Rates per 10,000 Population

Missouri, Calendar Year 2002



Includes reported cases of Campylobacteriosis, Cryptosporidiosis, E. Coli O157:H7, Giardiasis, Hepatitis A, Listeriosis, Salmonellosis, Shigellosis, Yersiniosis.

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CD: Foodborne/Waterborne

Campylobacteriosis

Campylobacteriosis is an infectious disease caused by a bacterium that affects the intestines. One of the most common causes of diarrheal illness in the United States, the campylobacter organism is fragile. It is susceptible to environmental stresses such as high oxygen levels, drying, heating, disinfectants, and acidic conditions. Campylobacter such as *C. laridis* and *C. hyointestinalis* can cause human gastroenteritis; however, 99% of the cases are caused by *C. jejuni*. Most people who get campylobacteriosis recover completely within two to five days, although sometimes recovery can take up to ten days.

Figure 3B: Campylobacteriosis By Month Of Report, Missouri 2002

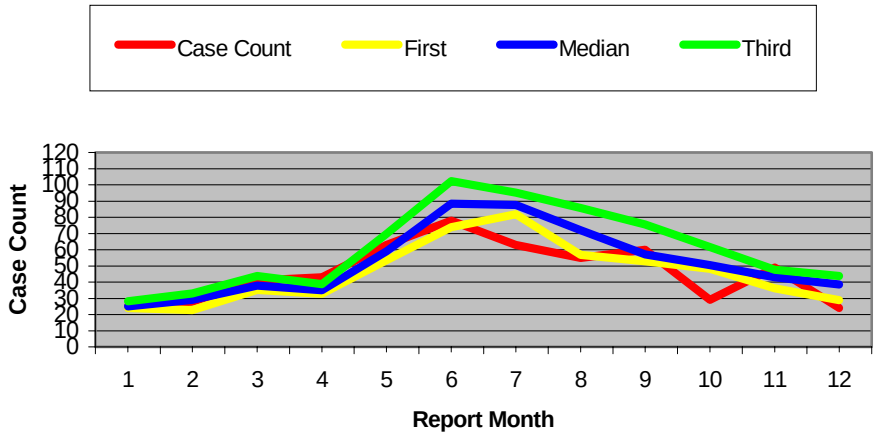


Table 1B: Campylobacteriosis by Age

Age Group	Percent of Total
0-4	15.3%
5-9	5.9%
10-14	2.9%
15-19	5.6%
20-24	8.3%
25-34	13.5%
35-44	16.3%
45-54	10.8%
55-64	9.3%
65-100	11.0%
UNKNOWN	1.3%

There were 557 cases of campylobacteriosis reported in Missouri in 2002, below the five-year median of 574 and the upper quartile of 628 (**See Figure 3B)**. The majority of cases were reported in the summer months when many enteric diseases are reported due to a lack of keeping cold foods cold enough.

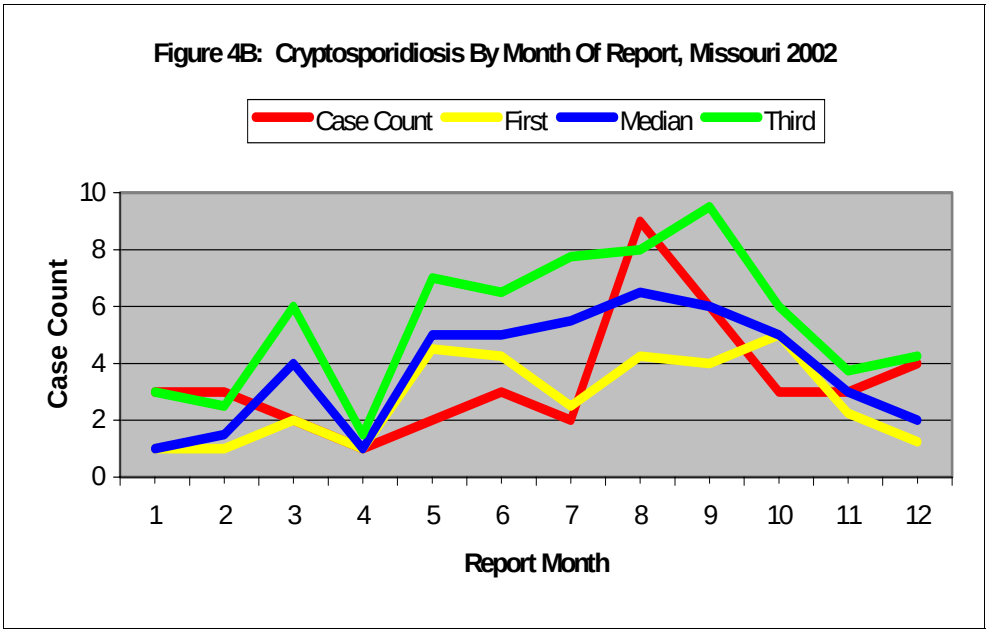
The racial breakdown was as follows: 2.0% were coded as Black, 51.9% were coded as White, and race was missing or coded as other in 45.2% of the cases. Blacks account for 11% of Missouri's population, so we are unable to determine from the coding if they are a large part of the missing racial data or if they are less likely to acquire this disease.

The 0-4 age group contains 15.3% of the cases, which is not uncommon in diseases with a fecal-oral route of transmission (**See Table 1B)**. The next largest groups affected are the 25-34 and 35-44 age groups, often because they provide care for the 0-4 age group. Gender is equally divided between male (50.3%) and female (49.6%). Campylobacteriosis is not nationally reportable, so there is no data available to compare Missouri's data with national statistics.

CD: Foodborne/Waterborne

Cryptosporidiosis

Cryptosporidiosis is an illness caused by the *Cryptosporidium parvum* protozoan and is characterized by diarrhea, abdominal cramps, loss of appetite, low-grade fever, nausea, and vomiting; however, infected persons may be asymptomatic. Recently it has become one of the most common causes of waterborne disease in the United States.



There were 41 cases of cryptosporidiosis reported in Missouri for 2002, which is above the five year median of 31 and the upper quartile of 38 **(See Figure 4B)**. Of the cases with known race, 70.7% were White and 9.8% were Black. The remainder 19.5% were coded as race unknown. The largest incidence within age groups was 26.8% in those 0-4 years of age and 12.20% in those 20-24 and 35-44 years of age **(See Table 2B)**. Female incidence (53.7%) is slightly higher than males (46.3%).

Although cases were reported all year, 17.1% were reported in August, 14.6% in October and 12.2% in September. Cases were fairly well distributed around the state. Missouri has a rate of 0.72 cases per 100,000, which is lower than the national rate of 0.97 per 100,000.

Table 2B: Cryptosporidiosis By Age Group

Age Group	Percent of Total
0-4	26.8%
05-09	9.8%
10-14	0.0%
15-19	7.3%
20-24	12.2%
25-34	9.8%
35-44	12.2%
45-54	4.9%
55-64	7.3%
65-100	9.8%
Unknown	0.0%

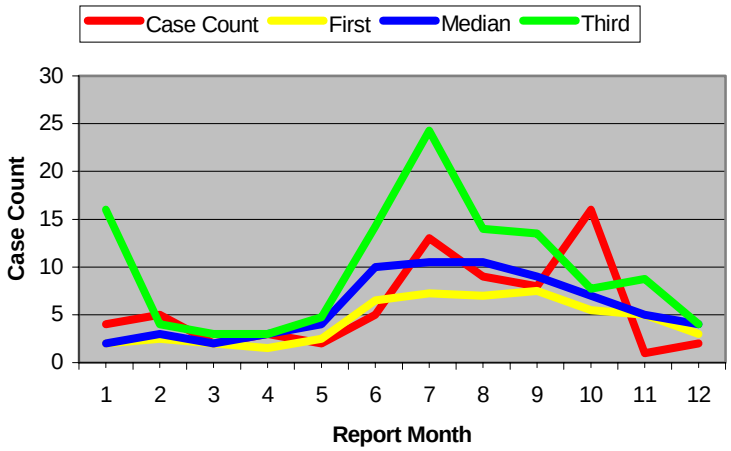
CD: Foodborne/Waterborne

E. coli O157:H7

E. coli O157:H7 causes an infection of variable severity characterized by diarrhea (often bloody) and abdominal cramps. Illness, particularly in young children, may be complicated by hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura; asymptomatic infections may also occur.

There were 70 cases of *E. coli* O157:H7 in 2002, with the bulk of cases occurring from July to October as seen in **Figure 5B** and expressed as percentages in **Table 3B**. The five year median is 58 cases and the upper quartile is 66. Cases were fairly evenly distributed across all ages with 34.2% in the 0-14 years of age group. The majority of the cases were female (55.7%) with males making up 44.3% of the cases. Missouri's rate for *E. coli* O157:H7 infection is 1.23 per 100,000, which matches the national rate.

Figure 5B: *E. coli* O157:H7 By Month Of Report, Missouri 2002



Two cases of HUS were reported among Missouri residents in 2002. Both cases occurred in white females who were less than 10 years old and occurred in Central and Southwest Missouri. Missouri has a rate for HUS of 0.04 per 100,000 versus the national rate of 0.07 per 100,000. Although Missouri's rate for *E. coli* O157:H7 infection equaled the national rate, HUS was reported almost twice as often nationally compared to Missouri. It is possible that cases of HUS were not reported in Missouri because they were not identified as an individual condition, but were viewed as a complication of *E. coli* O157:H7 infection. To alleviate the potential for under reporting, disease investigators in Missouri are focusing on HUS to ensure that it is now reported as a separate condition.

Table 3B: *E. coli* O157:H7 By Report Month

Report Month	Percent of Total
January	4.3%
February	7.1%
March	4.3%
April	4.3%
May	2.9%
June	7.1%
July	17.1%
August	12.9%
September	12.9%
October	22.9%
November	1.4%
December	2.9%

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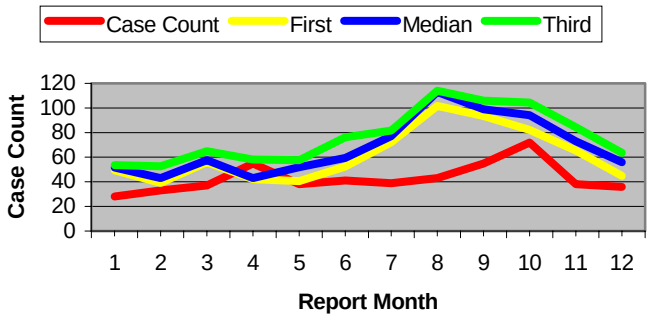
CD: Foodborne/Waterborne

Giardiasis

Giardiasis is an illness caused by the protozoan *Giardia lamblia* and is characterized by diarrhea, abdominal cramps, bloating, weight loss, or malabsorption, although some infected persons may be asymptomatic. There were 512 cases of giardiasis reported in Missouri during 2002. The lower quartile for giardiasis is 790, the median 800, and the upper quartile is 807.

Figure 6B: Giardiasis By Month Of Report, Missouri 2002



The breakdown by race is as follows: Unknown (49.0%), White (46.5%), Black (2.5%) and Asian (1.6%). Of the cases with known age, 24.2% (508) were in the age group of 0-4 and approximately 28% were in the age group 25-44.

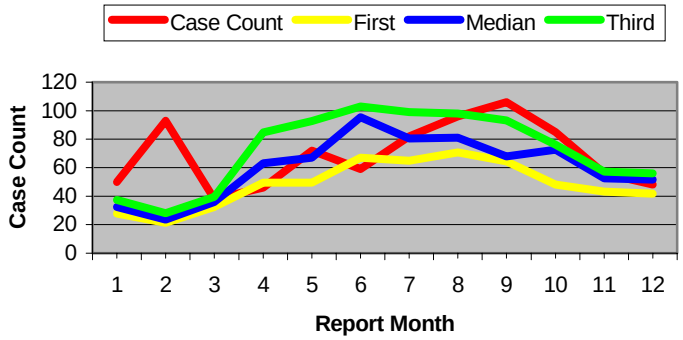
More males (55.5%) than females (44.1%) were reported as having giardiasis. Gender was not listed for the remaining .4% of cases.

Case reports were evenly divided throughout the year, although 10.4% of the cases were reported in September and 13.3% were reported in October **(See Figure 6B)**. Cases were reported statewide, but a majority of giardiasis occurring in Missouri was reported from St. Louis County (20.7%), St. Louis City (17.0%), St. Charles County (7.4%), Greene County (7.2%), and Boone County (4.5%). Missouri's rate of 9.02 per 100,000 is higher than the national rate of 5.91 per 100,000, but down from our expected rate of 12.7 per 100,000.

Salmonellosis

Laboratories and physicians reported 830 cases in 2002, which is above the five year median of 648 and the upper quartile of 713. There was an outbreak of the *Salmonella* Heidelburg serotype in the St. Louis area in February and an increase of individual cases of salmonella later in the year, but these individual cases were not associated with any particular serotype or outbreak **(See Figure 7B)**. The majority of salmonellosis cases did not have a race reported (56.6%). For the remainder of the cases 34.9% were reported as White, 8.2% as Black and 0.1% were Asian. Like many diseases where the route of transmission is fecal-oral, the largest age group among the ill was the 0-4 year olds (26.1%); however, cases appeared evenly distributed among the other age groups and did not show an increase in those age groups who would normally provide childcare for the 0-4 year olds. Gender was also evenly distributed with 51.9% female and 47.5% male and the remainder gender unknown. Cases were reported from 93 of 115 Missouri counties with the bulk (38.75%) in the eastern part of the state. Missouri's rate of 14.60 per 100,000 is above the national rate of 14.40 per 100,000.

Figure 7B: Salmonellosis By Month Of Report, Missouri 2002



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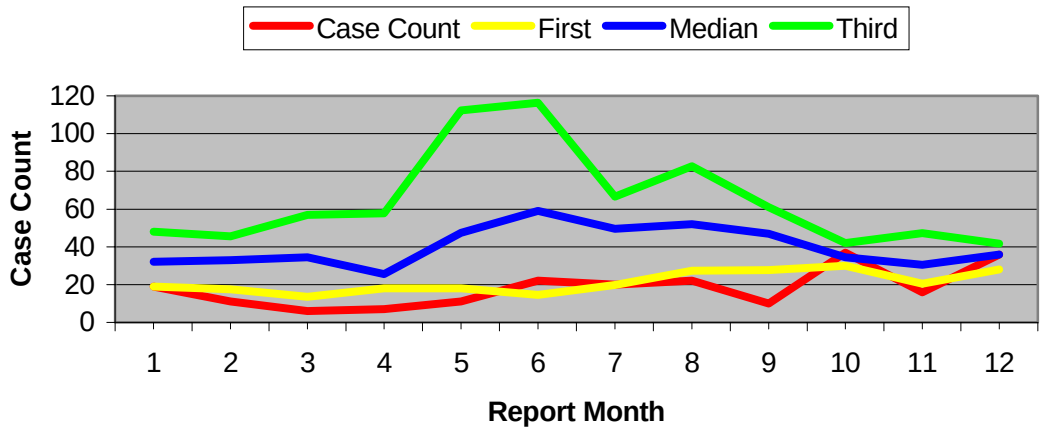
Shigellosis

Shigellosis is caused by bacilli of the Enterobacteriacea family that causes watery diarrhea, fever, abdominal cramping and headache. There are four major species of shigella bacilli that cause human illness: *S. sonnei* and *S. flexneri*, which are common in the United States, *S. dysenteriae* which is rare in the U.S. but common in rural Africa and India, and *S. boydii*, which is uncommon in the United States. Shigella are very virulent pathogens and a dose as small as 10 organisms can cause infection. Person-to-person transmission of this fecal-oral organism is more common than foodborne or waterborne transmission in the United States. Daycare outbreaks are common and shigellosis can become hyper-endemic and cycle in a community as children become resistant to the current serotype then skyrocket when newborn babies are introduced into the population. Only 217 cases were reported in Missouri in 2002, which is below the lower quartile of 222, the median of 321 and the upper quartile of 671 cases.

Cases were reported in every month; however, July (12.9%), August (9.7%), October (17.5%) and December (18.4%) had the highest incidence of disease **(See Figure 8B)**. Cases were reported from 28 counties and the majority of cases were from the large metro areas such as St. Louis City (24.0%) and St. Louis County (34.6%); however, other locations including the Joplin City Metropolitan area (7.4%) and Lincoln County (4.1%) had a surprising number of cases. Shigellosis rates in Missouri of 3.88 per 100,000 are almost half the national rate of 6.88.

Race was not reported in 60.4% of the cases, 26.3% were reported as White and the remainder 13.4% were Black. The age group with the greatest number of reported cases was 0-4 years of age with 39.2%, followed by 5-9 year olds with 19.4%. Individuals in the care-provider age groups of 25-34 and 35-44 were also elevated. A significantly greater number of females (56.2%) were reported than males (42.9%), possibly because a majority of childcare providers are female and shigellosis is readily transmitted in childcare environments. The remainder (0.9%) of reported cases were gender unknown.

Figure 8B: Shigellosis By Month Of Report, Missouri 2002



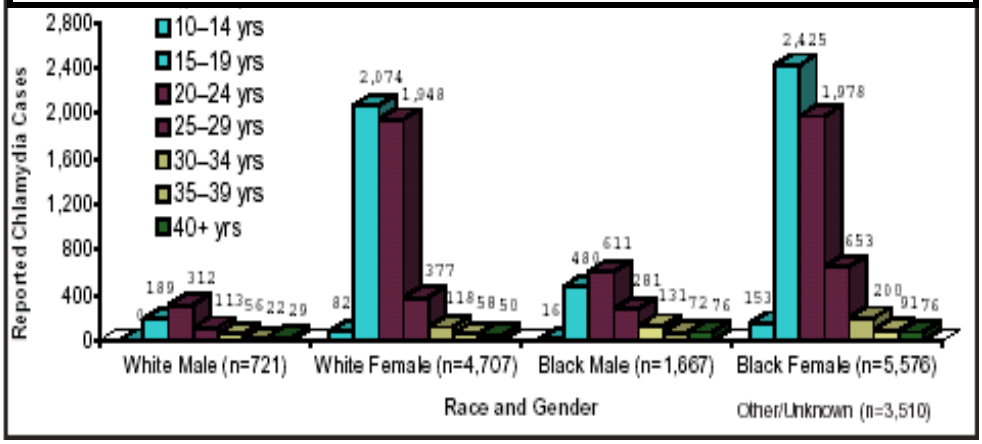
Sexually Transmitted Diseases

Chlamydia

Large numbers of Missourians are infected with *Chlamydia trachomatis* each year; 16,181 cases were reported in 2002 and additional persons were undoubtedly infected but not diagnosed and reported.

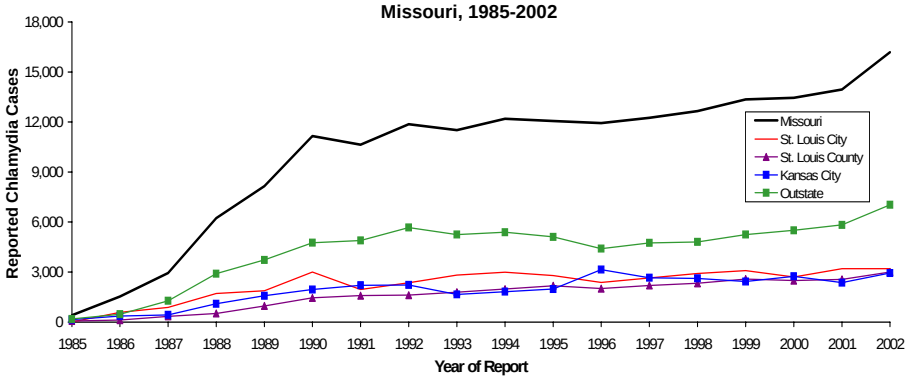
Based on available data, it is evident that in Missouri Blacks are disproportionately affected by Chlamydia, although not to the extent seen with syphilis and gonorrhea. The rate for cases reported in 2002 in Blacks (1,256.7 cases per 100,000) was approximately 11 times the rate for cases in Whites (115.3). Due to incomplete information, the race of about one-fifth of reported cases is not known. For all racial groups, the largest number of cases are reported from persons in their late teens and early twenties. Among both white and black females, the late teens is the age group with the most reported cases **(See Figure 9B)**.

Figure 9B: Reported Chlamydia Cases by Race, Gender and Age Group Missouri 2002



In 2002, the largest number (43.5%) of Chlamydia cases were reported from outstate Missouri, followed by St. Louis City (19.8%), St. Louis County (18.5%) and Kansas City (18.2%). However, the highest case rates were in St. Louis City (919.6 cases per 100,000), followed by Kansas City (666.5), St. Louis County (295.2) and outstate Missouri (185.7). Only Ripley and Knox Counties did not report a Chlamydia case in 2002 **(See Figure 10B)**. **Note:** "Outstate" Missouri excludes Platte, Clay, Jackson, St. Louis County and St. Louis City .

Figure 10B: Reported Chlamydia Cases by Geographic Area and Year of Report Missouri, 1985-2002



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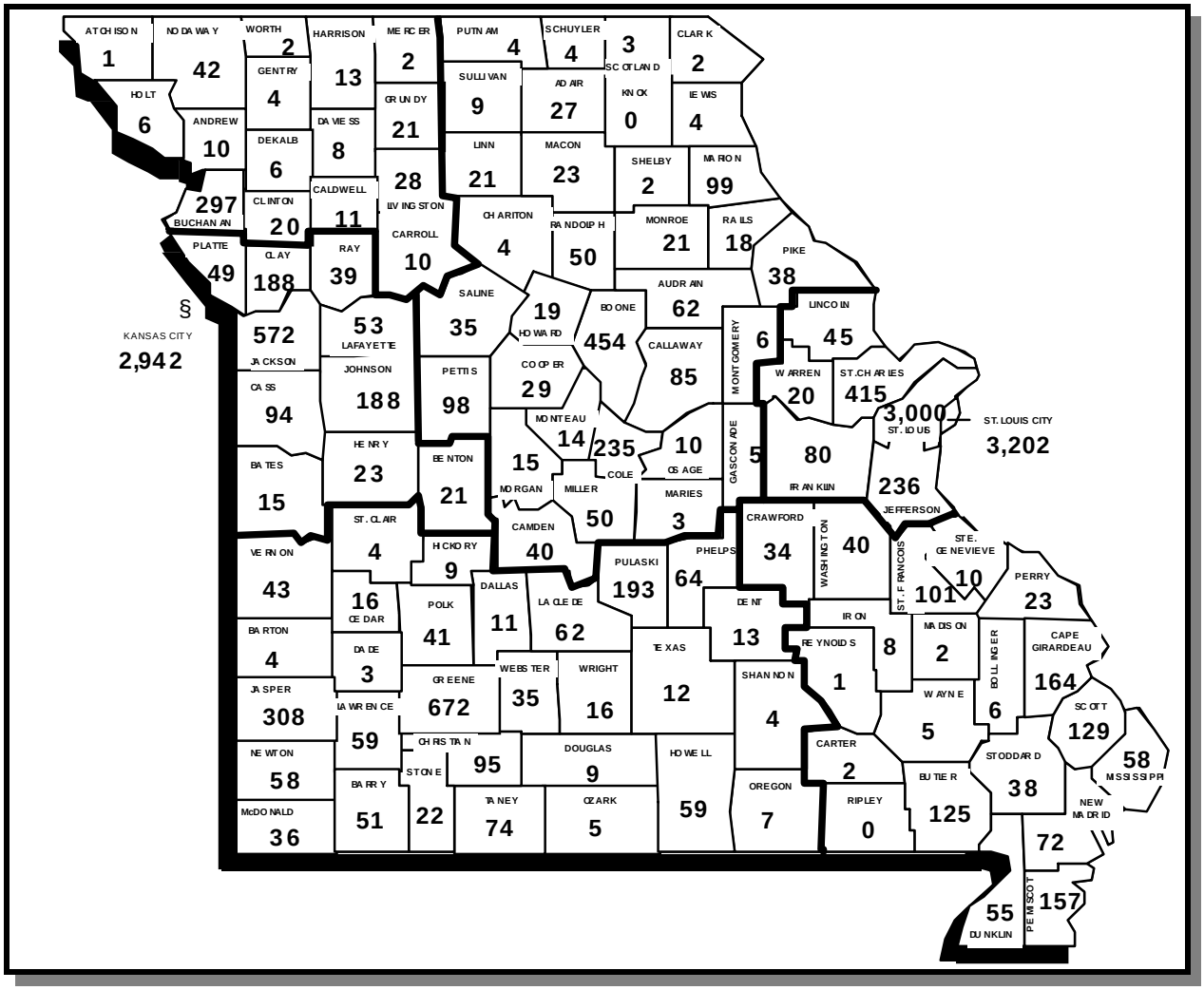
Since 1990, the number of cases reported each year has continued to increase. The 16,181 cases reported in 2002 represented a 16.0% increase from the 13,949 cases reported the preceding year. In 2002, Missouri ranked 23rd among the 50 states in rates of reported Chlamydia cases (289.2 cases per 100,000 population), slightly above the national rate of 288.6 cases. St. Louis City ranked 5th and Kansas City (Jackson County) 12th among 63 U.S. cities of >200,000 population in reported rates of Chlamydia cases **(See Figure 11B)**.

Figure 11B: Reported Chlamydia Cases by County, Missouri, 2002



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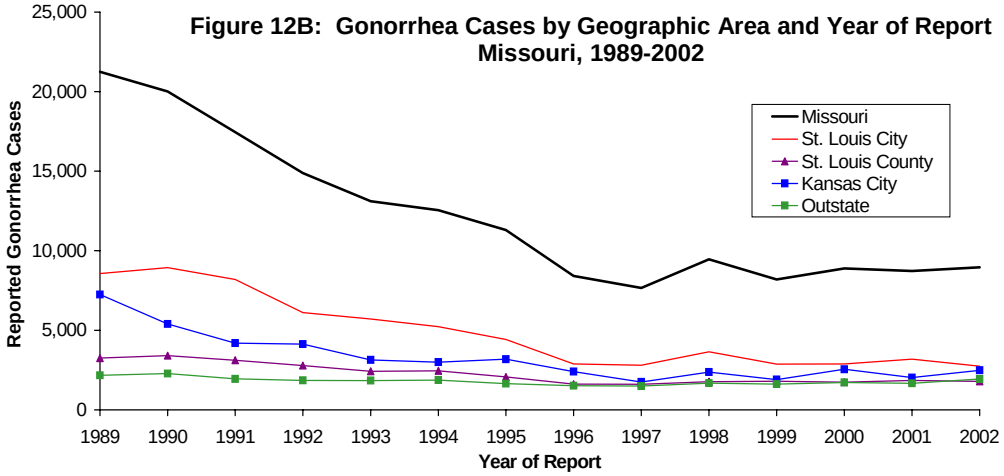
Gonorrhea

Large numbers of Missourians are infected with *Neisseria gonorrhoeae* each year; 8,952 gonorrhea cases were reported in 2002.

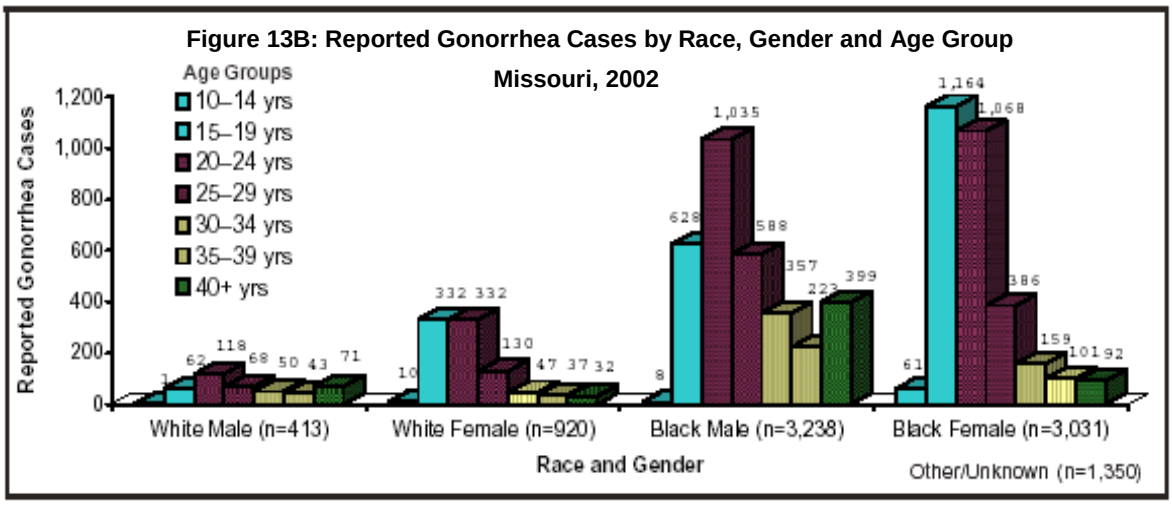
The annual number of reported gonorrhea cases in Missouri decreased each year from 1989 to 1997; since that time, the rate has remained relatively constant. The 8,952 cases reported in 2002 represented a 2.6% increase from the 8,723 cases reported the preceding year **(See Figure 12B)**.

Figure 12B: Gonorrhea Cases by Geographic Area and Year of Report Missouri, 1989-2002



In Missouri, as well as nationwide, the largest burden of infection is in Blacks, among teenagers and young adults, and in urban areas. However, gonococcal infections, although on a smaller scale, are also occurring in other groups of individuals and in non-urban areas. The rate for gonorrhea cases reported in Missouri in 2002, 160.0 cases per 100,000 persons, is above the national rate of 122.0 cases per 100,000, and is well above the Healthy People 2010 (HP2010) national objective of 19 cases per 100,000 persons. Blacks continue to be very disproportionately affected. In 2002, 6,289 (70.3%) gonorrhea cases were reported in blacks compared to 1,339 (15.0%) cases in whites, and the rate of reported black cases (999.2) was 35 times the rate for whites (28.2). For Blacks and Whites, the largest numbers of cases are reported in persons in their late teens and early twenties. Among females, the late teens are the age group with the most reported cases, whereas among males, the largest number of cases are in the 20-24 year or age group **(See Figure 13B)**.

Figure 13B: Reported Gonorrhea Cases by Race, Gender and Age Group Missouri, 2002



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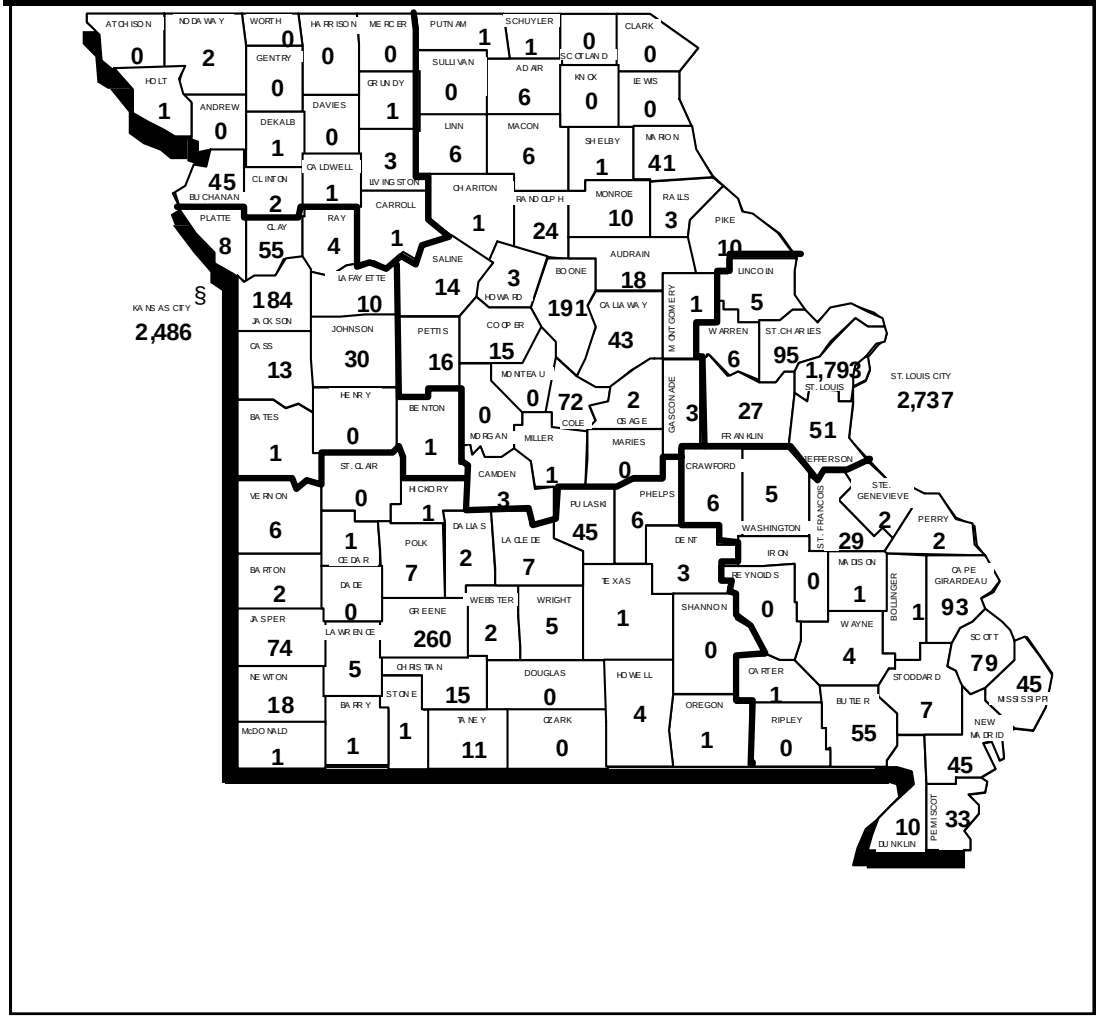
STD

In 2002, the largest number of gonorrhea cases, and the highest rates, were reported from St. Louis City, followed by Kansas City, St. Louis County, and Outstate Missouri. Cases were reported from 91 (79.8%) of Missouri's 114 counties (and from St. Louis City) **(See Figure 14B)**. In 2002, Missouri ranked 13th among the 50 states in rates of reported gonorrhea cases; in addition, with a rate of 786.1 cases per 100,000 population, St. Louis topped the list and Kansas City (Jackson County) ranked 5th (with a rate of 580.9) among 63 U.S. cities of >200,000 population in reported rates of gonorrhea cases.

Comment:

The fact that large numbers of new infections are occurring each year in Missouri is an ongoing cause for concern, especially because of the potential sequelae (particularly in women) that can result, and because the presence of an inflammatory STD such as gonorrhea can facilitate the transmission of HIV.

Figure 14B: Reported Gonorrhea Cases by County, Missouri, 2002



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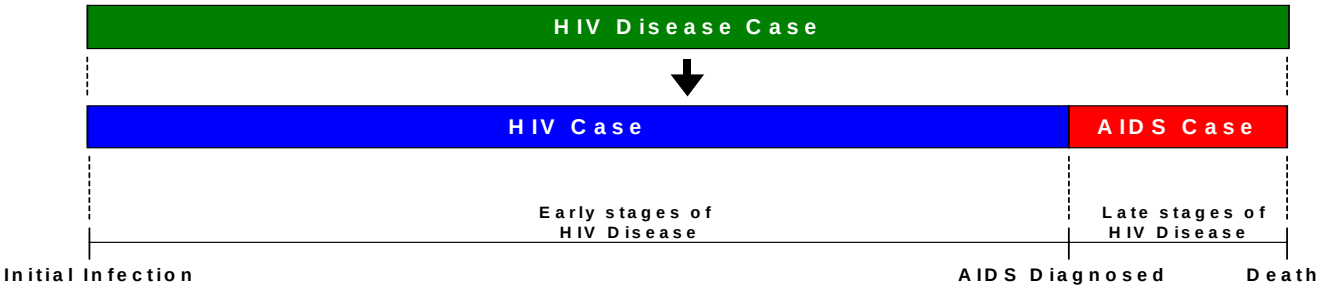
HIV Disease in Missouri—2002
General Summary and Comments

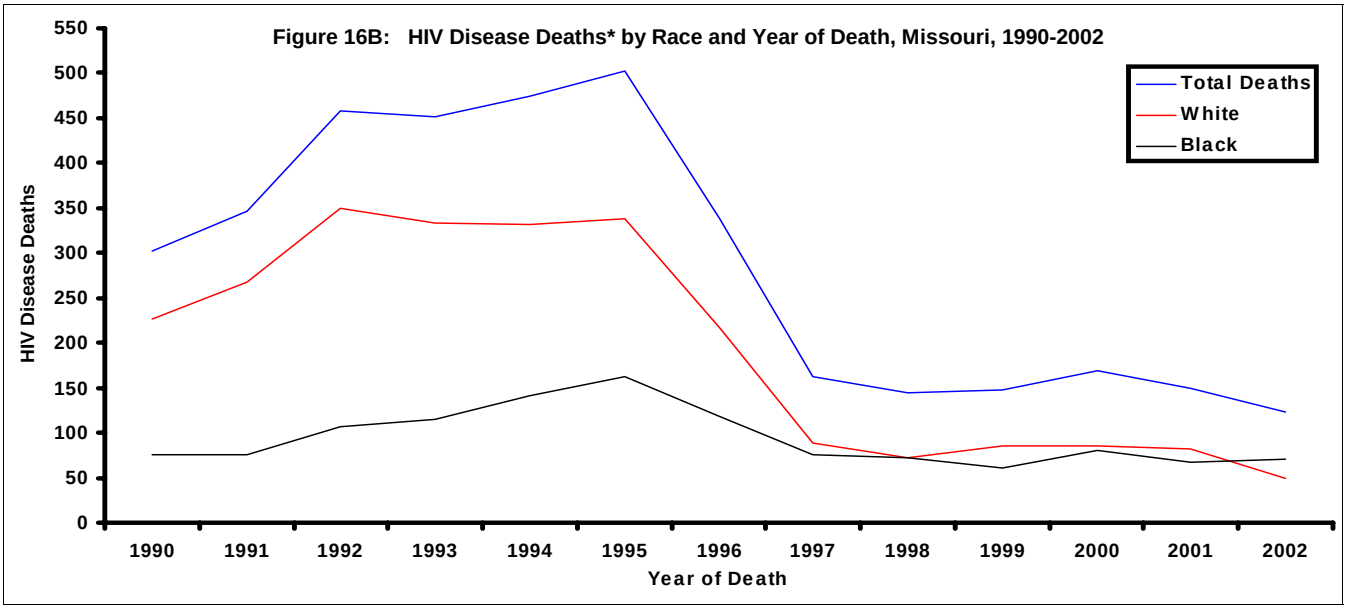
In Missouri all cases of Acquired Immunodeficiency Syndrome (AIDS), confirmed positive tests for infection with the Human Immunodeficiency Virus (HIV), CD4 T cell counts, and viral load tests must be reported to the Missouri Department of Health and Senior Services.

To understand the epidemiology (i.e., occurrence) of HIV Disease in Missouri, it is necessary to examine not only HIV Disease cases, but also the sub-categories of AIDS cases and HIV cases. From the time a person is infected with HIV until death, he/she has **HIV Disease**. All persons with HIV Disease can be sub-classified as either an AIDS case (if they are in the later stages of the disease process and have met the case definition for AIDS) or an HIV case (if they are in the earlier stages of the disease process and have not met the AIDS case definition). This is illustrated in **Figure 15B** below:

Figure 15B: Relationship of HIV Disease Cases, HIV Cases, and AIDS Cases



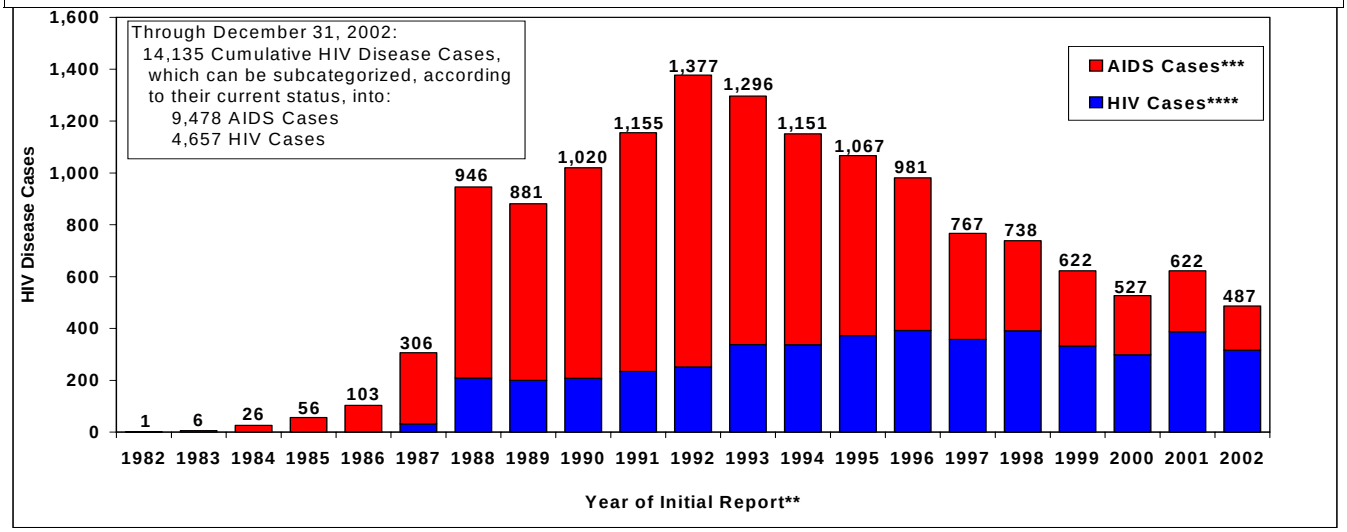
Since 1982, 14,135 HIV-infected Missouri residents (i.e., persons with HIV Disease) have been reported to the Missouri Department of Health and Senior Services. Of these 14,135 HIV Disease cases, 9,478 (67.1%) are sub-categorized as AIDS cases, and the remaining 4,657 (32.9%) are subcategorized as HIV cases. During 2002, 123 HIV-related deaths in Missouri residents were reported, a decrease of 18.0% from the 150 HIV-related deaths reported in 2001 **(See Figure 16B)**.



The annual number of **newly** reported (i.e., initially reported for the first time to public health officials) HIV Disease cases had decreased each year from 1992 through 2000. However, the 622 HIV Disease cases initially reported in Missouri residents in 2001 represented an 18.0% increase from the 527 cases reported in 2000; but the 487 new HIV Disease cases reported in 2002 represents a 21.7% decrease from the 622 cases reported in the previous year, and is consistent with the decreasing trend noted since 1992 **(See Figure 17B)**.

The majority of new HIV infections (71.5% in 2002) occur in persons 20-39 years of age. Although relatively small in number, infections are also occurring in Missouri teenagers (4.4% in 2002). CDC estimates that, nationwide, about half of all new HIV infections are in young people under 25 years of age. In 2002, no infected infants were born to HIV-infected mothers. More generally, the proportion of HIV-exposed infants who became infected was noticeably less for those born during the period from 1995-2002, compared to those born during the earlier period from 1993-1994 (6.9% vs. 26.4%). This difference reflects the use, starting in mid-to late-1994, of zidovudine (AZT,ZDV) treatment to reduce the risk of perinatal HIV transmission.

Figure 17B: Reported HIV Disease Cases by Current Status* and Year of Initial Report**



* HIV Case vs. AIDS Case

**Cases are indicated by year of their initial report to the Missouri Department of Health and Senior Services(i.e., by the year in which the first report of the person, whether as an HIV case or an AIDS case, was received by the department.)

***These cases were either: 1) initially reported as HIV cases and then later reclassified as AIDS cases because they had subsequently come to meet the AIDS case definition; or 2) initially reported as an AIDS case.

****These cases were initially reported as HIV cases, and have subsequently remained HIV cases (i.e., they have not met the case definition for AIDS).

In 2002, Blacks made up 43.0% of reported HIV cases and 44.4% of reported AIDS cases. Given that Blacks make up only about 11% of the state's population, this clearly indicates the disproportionate representation among HIV-infected persons. Also, 57% of AIDS-related deaths in 2002 were in Blacks.

For Hispanics, the total numbers of cases reported for HIV and AIDS is small (14 HIV cases and 14 AIDS cases in 2002). According to 2000 census data, Missouri's Hispanic population grew by 92.2% during the period from 1990 to 2000. Numbers of reported HIV and AIDS cases in Asians and American Indians have been very small; each of these groups comprises less than 0.5% of total reported HIV and AIDS cases **(See Table 4B on next page)**.

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Table 4B: Reported HIV and AIDS Cases by Gender, Race/Ethmicity, and Age at Diagnosis

Missouri, 1982-2002

	HIV Cases				AIDS Cases				HIV Disease	
	Reported 2002*		Cumulative		Reported 2002		Cumulative		Cumulative	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Gender										
Male	250	79.1%	3,848	82.6%	298	82.8%	8,520	89.9%	12,368	87.5%
Female	66	20.9%	809	17.4%	62	17.2%	958	10.1%	1,767	12.5%
Race/Ethnicity										
White	156	49.4%	2,504	53.8%	185	51.4%	6,098	64.3%	8,602	60.9%
Black	136	43.0%	1,981	42.5%	180	50.0%	3,125	33.0%	5,106	36.1%
Hispanic	14	4.4%	114	2.4%	14	3.9%	197	2.1%	311	2.2%
Asian/Pacific Islander	2	0.6%	16	0.3%	1	0.3%	26	0.3%	42	0.3%
American Indian	2	0.6%	15	0.3%	0	0.0%	32	0.3%	47	0.3%
Unknown	6	1.9%	27	0.6%	0	0.0%	0	0.0%	27	0.2%
Race/Ethnicity and Gender										
White Male	131	41.5%	2,193	47.1%	168	46.7%	5,701	60.1%	7,894	55.8%
Black Male	96	30.4%	1,507	32.4%	119	33.1%	2,587	27.3%	4,094	29.0%
Hispanic Male	13	4.1%	101	2.2%	11	3.1%	181	1.9%	282	2.0%
Asian/Pacific Islander Male	2	0.6%	12	0.3%	0	0.0%	22	0.2%	34	0.2%
American Indian Male	2	0.6%	14	0.3%	0	0.0%	29	0.3%	43	0.3%
Unknown Male	6	1.9%	21	0.5%	0	0.0%	0	0.0%	21	0.1%
White Female	25	7.9%	311	6.7%	17	4.7%	397	4.2%	708	5.0%
Black Female	40	12.7%	474	10.2%	41	11.4%	538	5.7%	1,012	7.2%
Hispanic Female	1	0.3%	13	0.3%	3	0.8%	16	0.2%	29	0.2%
Asian/Pacific Islander Female	0	0.0%	4	0.1%	1	0.3%	4	0.0%	8	0.1%
American Indian Female	0	0.0%	1	0.0%	0	0.0%	3	0.0%	4	0.0%
Unknown Female	0	0.0%	6	0.1%	0	0.0%	0	0.0%	6	0.0%
Age at Diagnosis										
<13	1	0.3%	45	1.0%	1	0.3%	58	0.6%	0	0.0%
13-19	14	4.4%	214	4.6%	5	1.4%	101	1.1%	0	0.0%
20-29	99	31.3%	1,734	37.2%	50	13.9%	2,080	21.9%	0	0.0%
30-39	127	40.2%	1,777	38.2%	151	41.9%	4,308	45.5%	0	0.0%
40-49	59	18.7%	684	14.7%	108	30.0%	2,083	22.0%	0	0.0%
50+	16	5.1%	203	4.4%	45	12.5%	848	8.9%	0	0.0%
Missouri Total	316	100.0%	4,657	100.0%	360	100.0%	9,478	100.0%	14,135	100.0%

*HIV Cases reported during 2002 which remained HIV cases at the end of the year.

For HIV Cases, Age at Diagnosis is the age at which the individual was first diagnosed with HIV infection.

For AIDS Cases, Age at Diagnosis is the age at which the individual was first diagnosed with AIDS.

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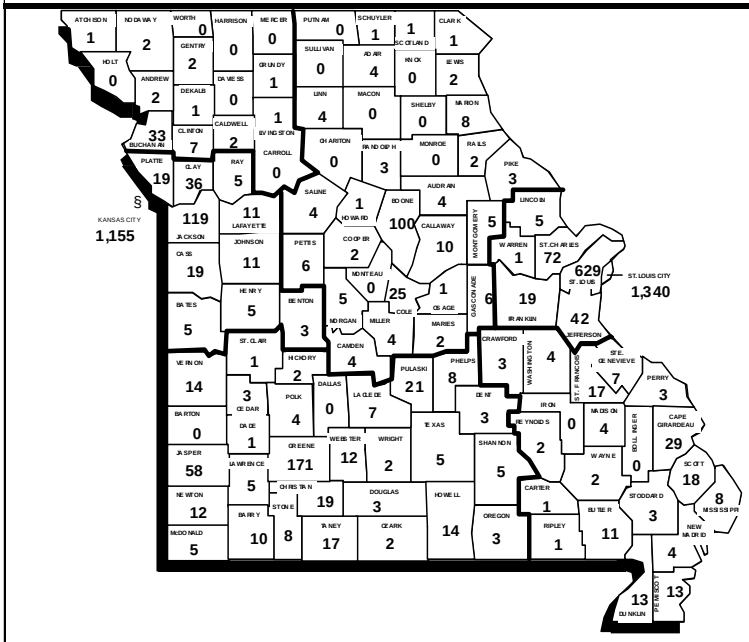
Figure 18B: Reported HIV Cases By County of Residence at Time of Diagnosis*, Missouri, Cumulative Through 2002

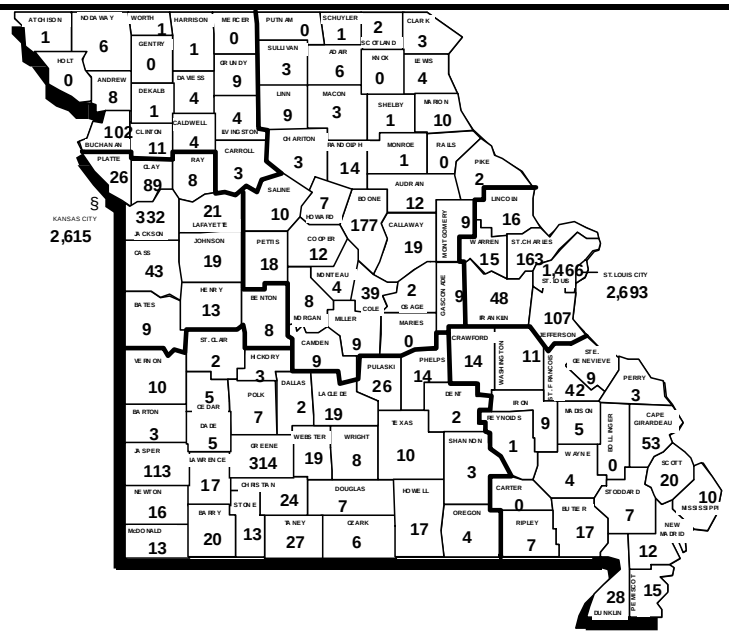


*Does not include persons living in correctional facilities at time of diagnosis

Cases of HIV Disease disproportionately occur in the state's two metropolitan areas (St. Louis and Kansas City). The highest rates of HIV and AIDS cases, as well as the largest numbers of cases, are found in these two areas. Of the total reported HIV Disease cases, 70.0% come from St. Louis City, St. Louis County, or Kansas City. However, only five Missouri counties have no reported HIV or AIDS cases **(See Figures 18B and 19B)**.

There is an obvious need for continued emphasis on prevention of new infections, and for trying to ensure that all infected persons can access needed care services. Everyone needs to clearly understand that despite medical advances, HIV infection remains a serious, usually fatal disease that requires complex, costly, and difficult treatment regimens that do not work for everyone. As better treatment options are developed, we must not lose sight of the fact that preventing HIV infection in the first place precludes the need for people to undergo these difficult and expensive therapies.

Figure 19B: Reported AIDS Cases by County of Residence at Time of Diagnosis*, Missouri, Cumulative Through 2002



*Does not include persons living in correctional facilities at time of diagnosis.

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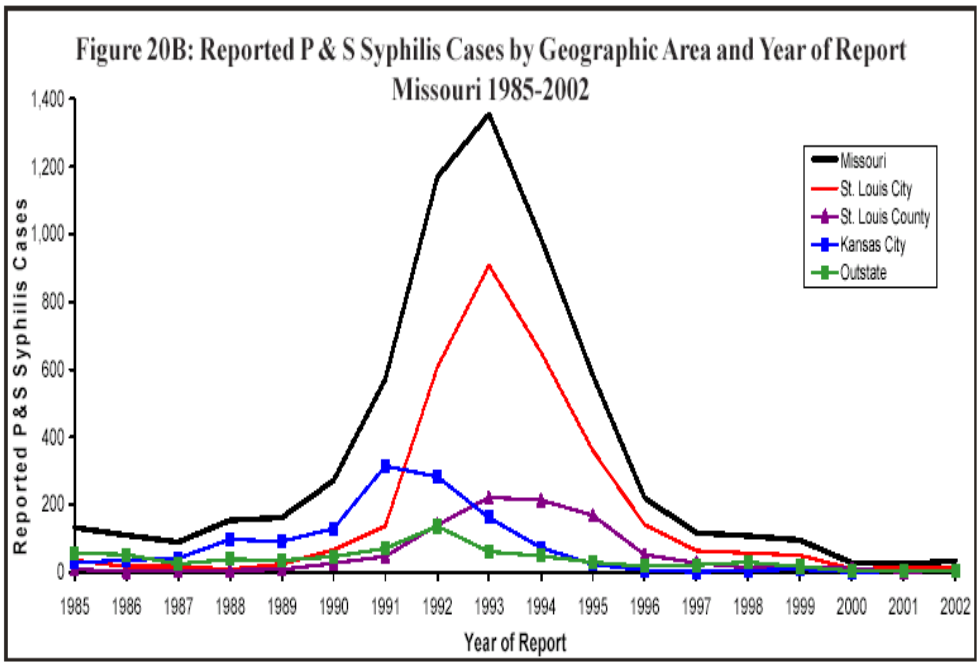
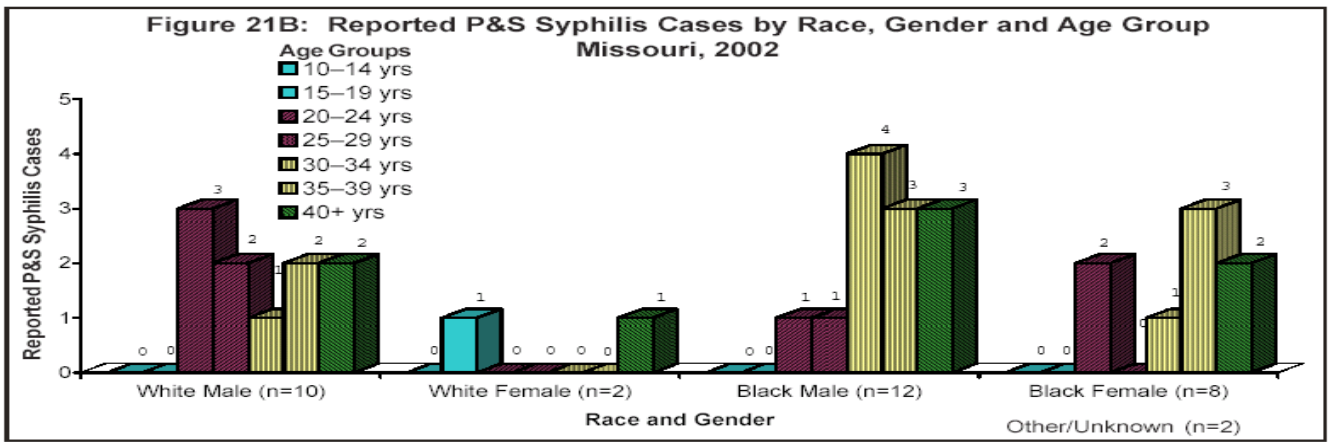
Syphilis: Primary and Secondary (P&S)



The annual number of reported cases of Primary and Secondary (P&S) syphilis in Missouri has been decreasing since 1993 **(See Figure 20B)**. However, the 34 cases of P&S syphilis reported in 2002 represented a 30.8% increase from the 26 cases reported during 2001. An additional 51 cases of early latent syphilis (duration of less than 1 year) were reported during 2002; a 54.5% increase from the 33 cases reported in 2001.

Blacks continue to be disproportionately affected by syphilis (58.8% of the cases reported in 2002), and the rate (3.2 cases per 100,000) is approximately 11 times the rate for Whites (0.3) **(See Figure 21B)**. The average age at the time of diagnosis is higher for reported cases of P&S syphilis compared to reported cases of chlamydia or gonorrhea; a noticeable proportion of cases are seen in persons greater than 35 years of age. In 2002, 13 (38.2%) of the 34 reported P&S syphilis cases were from St. Louis City followed by 7 (20.6%) cases each from St. Louis County, Kansas City and the Outstate area. The highest rates of reported P&S syphilis cases were in St. Louis City (3.7 cases per 100,000); much lower rates were seen in Kansas City, St. Louis County, and the Outstate area. Only nine of the state's 114 counties (and St. Louis City reported P&S syphilis cases in 2002.

In 2002, Missouri ranked 38th among the 50 states in rates of reported P&S syphilis cases. In addition, St. Louis ranked 29th and Kansas City 43rd among 63 U.S. cities of > 200,000 population in P&S syphilis rates.



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Vaccine-Preventable Diseases

Hepatitis A

Hepatitis A is a ribonucleic acid virus of the picornavirus group which can adversely affect the liver. It has a fecal-oral route of transmission and can cause fever, malaise, jaundice, anorexia, diarrhea and nausea. Since the introduction of the Hepatitis A vaccine there has been a reduction in cases from a high in 1996 of 1,414 to a low of 84 in 2002. The median number of cases was 637 and the upper quartile was 712 cases.

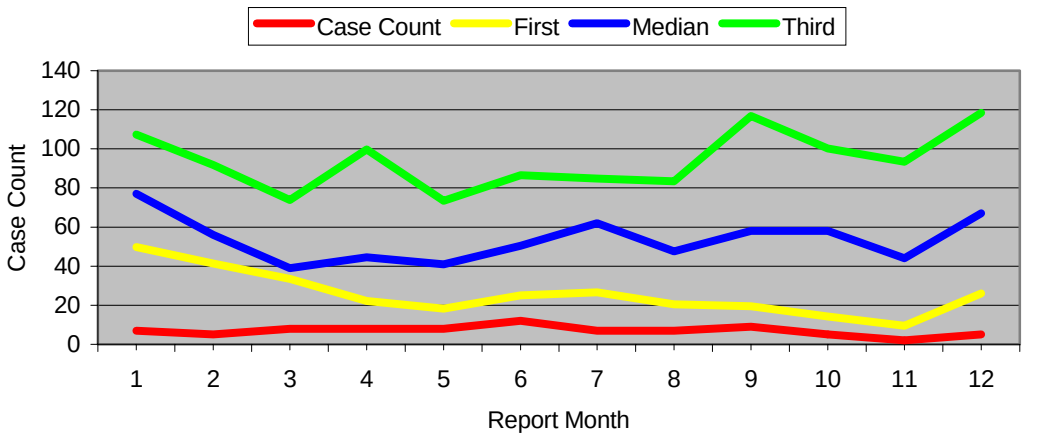
It is important to collect information on demographics such as race, sex and age because shifts in the any of the demographic information, such as race, may signal a change in the epidemiology of the disease. In 2002, 50.0% of the cases were White and the remainder were unknown.

Males were reported as 53.6% of the cases and 46.4% were female.

Cases occurred throughout the year with peaks in May, June and September **(See Figure 22B)**. Cases of Hepatitis A were reported statewide; however, 11 cases (13.1%) occurred in Howell County, thus identifying it as the county with the highest rate per 100,000 (29.5) of any Missouri county.

Missouri's rate of 1.48 per 100,000 was lower than the national rate of 2.84 per 100,000, which is directly related to increased Hepatitis A vaccination statewide.

Figure 22B: Hepatitis A By Month Of Report, Missouri 2002



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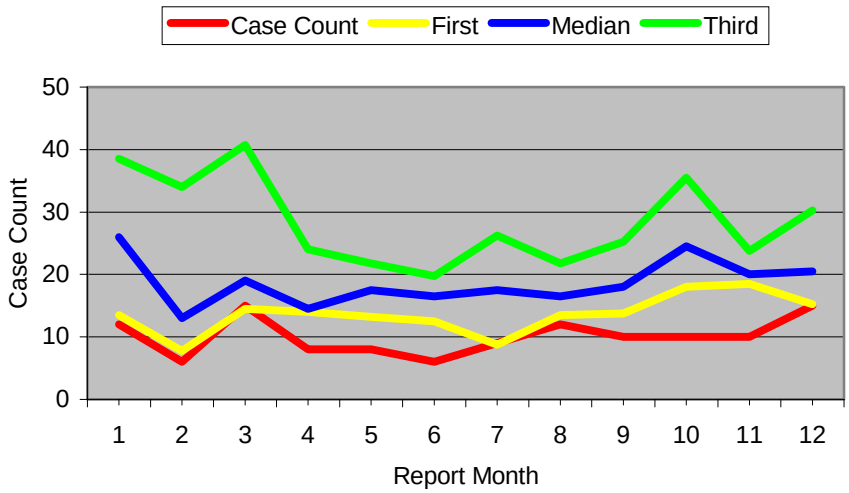
Hepatitis B

Hepatitis B is a deoxyribonucleic acid (DNA) Hepadnavirus which affects the liver. It is transmitted through blood or body fluids and can cause anorexia, malaise, nausea, jaundice, and even death. Also, unlike Hepatitis A, it has a chronic carrier state.

Since the introduction of Hepatitis B vaccine in the early nineties, there has been a decrease in the number of cases in Missouri. In 2002, there were 119 cases reported, which is below the median of 227 and the upper quartile of 252 **(See Figure 23B)**. Asians make up 2.5% of Missouri's population, but, as seen in the **Table 5B** below, they comprise 3.31% of the cases. The youngest case was 16 years old and the oldest 78, with the bulk of cases occurring among 35-44 years of age group. The remainder of cases were of unknown age.

Figure 23B: Hepatitis B By Month Of Report, Missouri 2002



Males (53.8%) predominate in this disease over females (46.2%). Cases were evenly distributed throughout the year with no seasonality noted. While cases were reported from many areas in Missouri, Greene County had 16.8% of the cases, St. Louis City 17.6%, St. Louis County 10.9%, and Kansas City (7.6%).

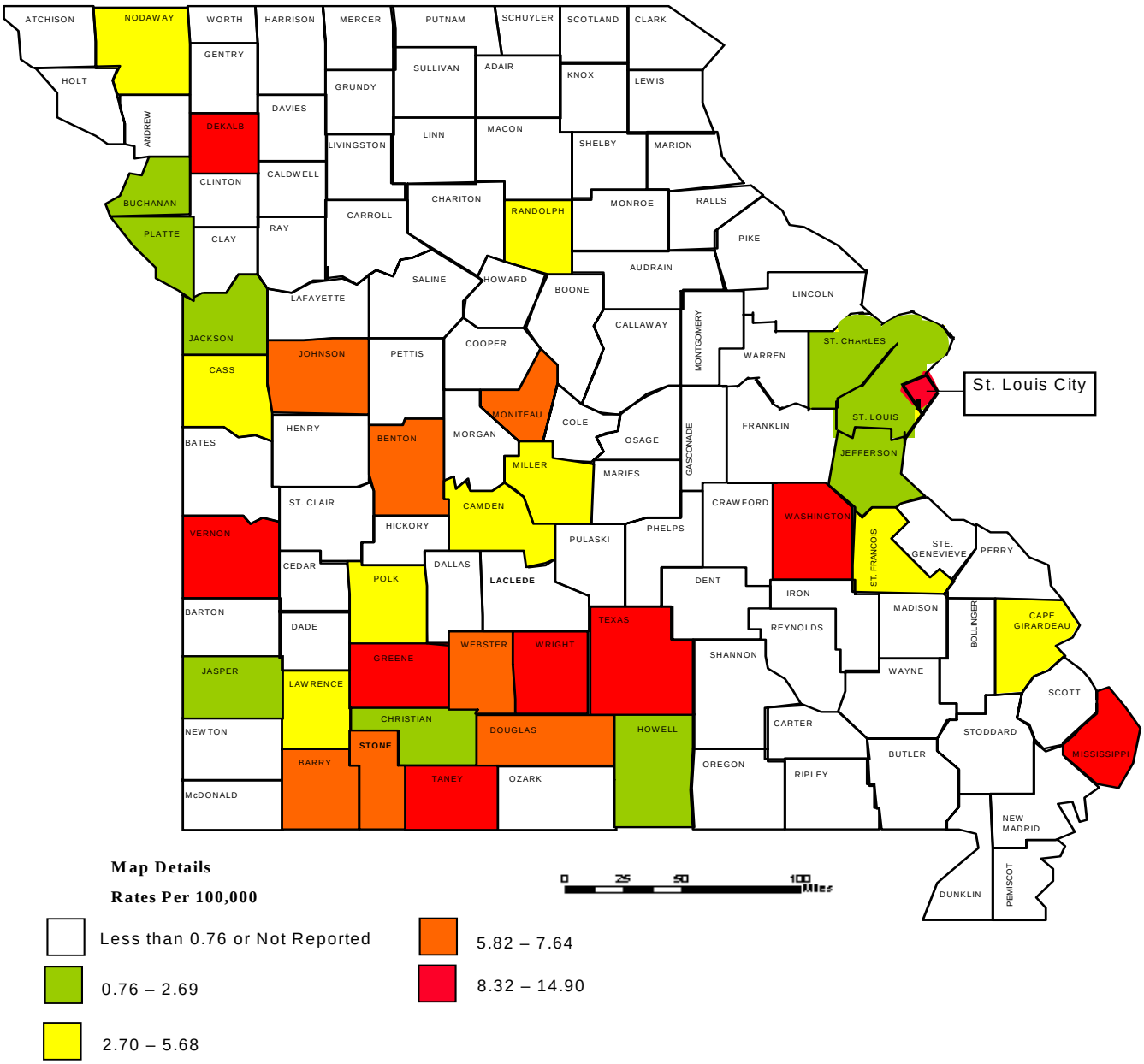
Missouri has a comparable rate (2.10 cases per 100,000) to the national rate (2.37 cases per 100,000). **Figure 24B** on page 32 shows Hepatitis B incidence rates for each Missouri county for 2002.

Table 5B: Hepatitis B By Race

Race	Percentage of Total
ASIAN	2.5%
BLACK	15.1%
WHITE	40.3%
UNKNOWN	43.0%

Vaccination of high-risk members of the drug culture, as well as childhood vaccination, should lead to continued decreases in the morbidity for Hepatitis B infection in Missouri.

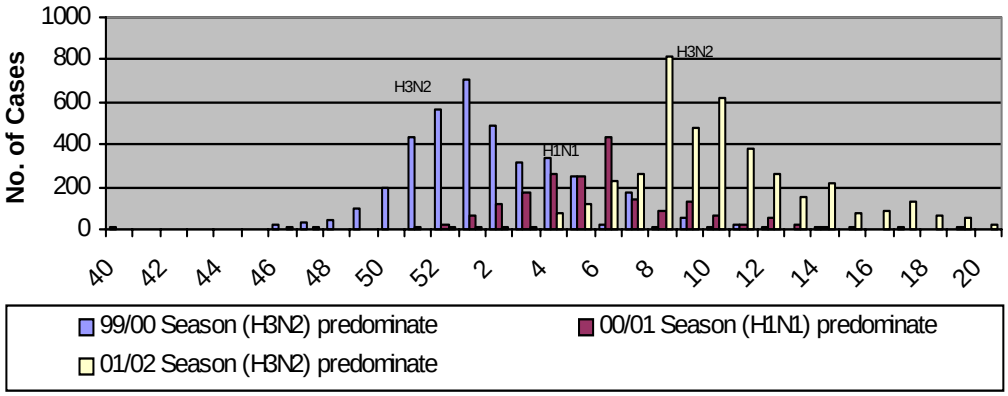
Figure 24B: Hepatitis B Rates in Missouri Counties, 2002



Influenza

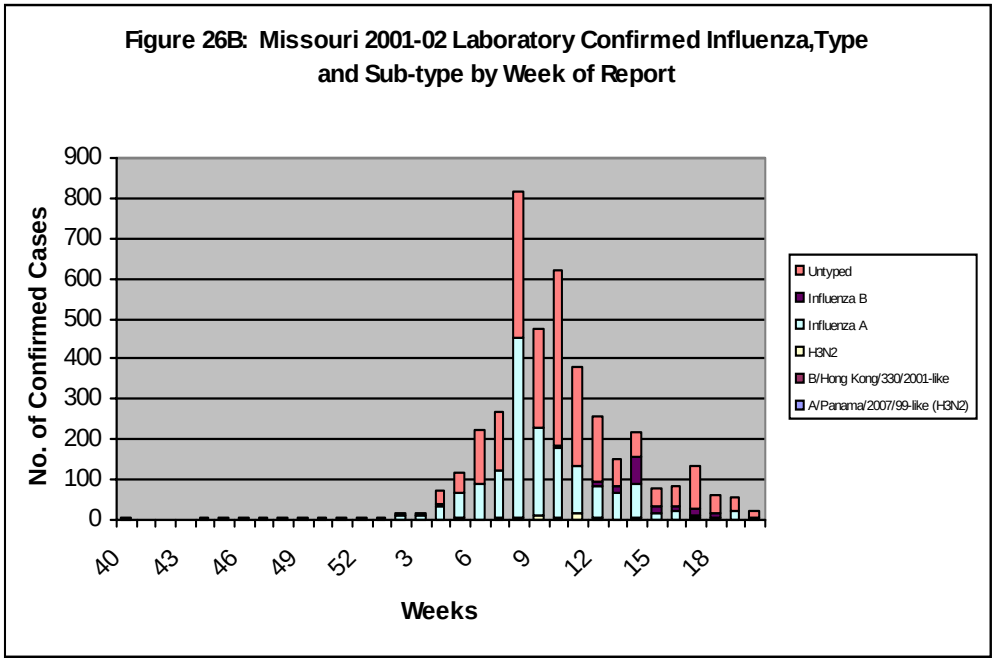
The 2001-02 influenza season began later than usual and continued beyond the typical mid-May season. Of the laboratory-confirmed influenza cases, influenza A (H3N2) dominated the 2001-02 influenza season in Missouri, and the impact was moderate to severe compared to the mild, predominately influenza A (H1N1) season of 2000-01. Laboratory-confirmed influenza reported in Missouri 2001-02 (4,115 cases) was higher than in 2000-01 (1,896 cases) and in 1999-00 (3,820 cases) **(See Figure 25B)**.

Figure 25B: Laboratory Confirmed Influenza in Missouri (Comparison of 1999 -2002 Influenza Seasons by Week of Report.)



Of the 4,115 laboratory-confirmed cases, 1,675 (41%) were type A. Of those, 81 were sub-typed as influenza A (H3N2), and of those 11 were antigenically characterized by CDC as A/Panama/2007/99-like (H3N2). There were 186 (5%) laboratory-confirmed cases of influenza B, of which five were antigenically characterized as B/Hong Kong/330/01-like. The remaining 2,254 (54%) laboratory-confirmed cases were detected by the influenza *rapid-testing* method without type differentiation **(See Figure 26B)**.

Figure 26B: Missouri 2001-02 Laboratory Confirmed Influenza,Type and Sub-type by Week of Report



The last laboratory-confirmed (by viral culture) case of Influenza A in Missouri was diagnosed on April 30, 2002; the last laboratory-confirmed case of Influenza B was diagnosed on June 14, 2002; while the last case of untyped influenza in Missouri was diagnosed on June 12, 2002 by *rapid test* method.

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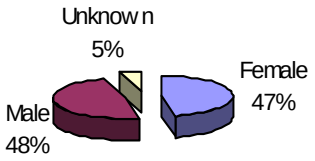
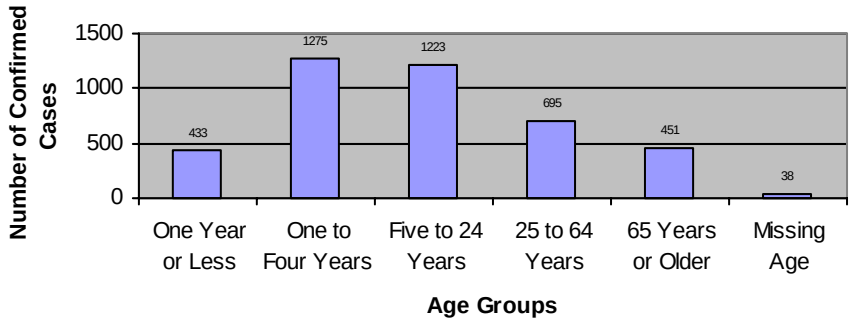
Reported influenza illness in Missouri occurred almost equally among genders. Of the laboratory-confirmed cases reported, 47% (1,954) were female, 48% (1,967) were male and in 5% (194) of the cases, the gender was unknown **(See Figure 27B)**.

Figure 27B: Laboratory-Confirmed Influenza In Missouri 2001-2002 For Weeks 40-20



Incidence of influenza in Missouri followed a characteristic pattern among the groups, typically the least immunized. Numbers were highest among those aged one to 24 years of age. Given the focus of current immunization practices targeted toward those at high-risk for influenza-related complications, the low incidence of laboratory-confirmed cases reported among the elderly is remarkable **(See Figure 28B)**.

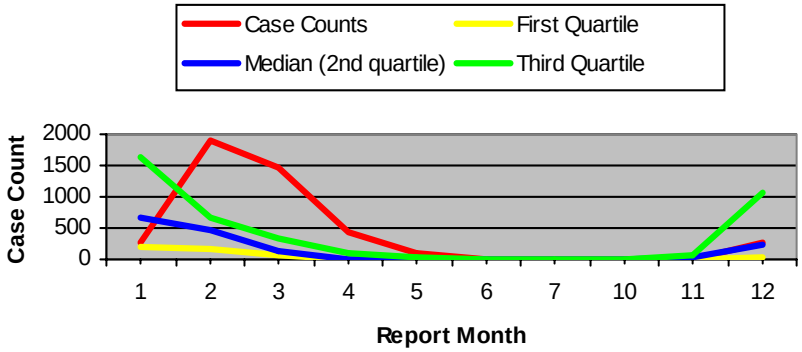
Figure 28B: Laboratory-Confirmed Influenza Cases in Missouri 2001-02 Season October 2001 through May 18, 2002



Influenza infection rates and influenza-related complications are generally high among young children. Seasonal nationwide increases in hospitalizations among children one year of age and younger can be attributed to influenza and influenza-related complications. Although other respiratory viruses surface concurrently, children in Missouri were affected heavily by influenza in 2001-02. Among the 4,115 laboratory-confirmed cases reported in Missouri, 68% (2,783) were among those 19 years of age or younger, a 4% increase from the previous year. Furthermore, it is important to note that 42% (1,708) of the total cases (4,115) occurred in children under age five.

Influenza is typically a seasonal disease occurring during the month of October of one year and continuing through March of the following year. However, concerns with pandemic influenza and influenza-like respiratory illness, have changed influenza reporting to a year-round event. **Figure 29B** shows the case counts by month for 2002 and the five year median for those months.

Figure 29B: Influenza By Month Of Report, Missouri 2002



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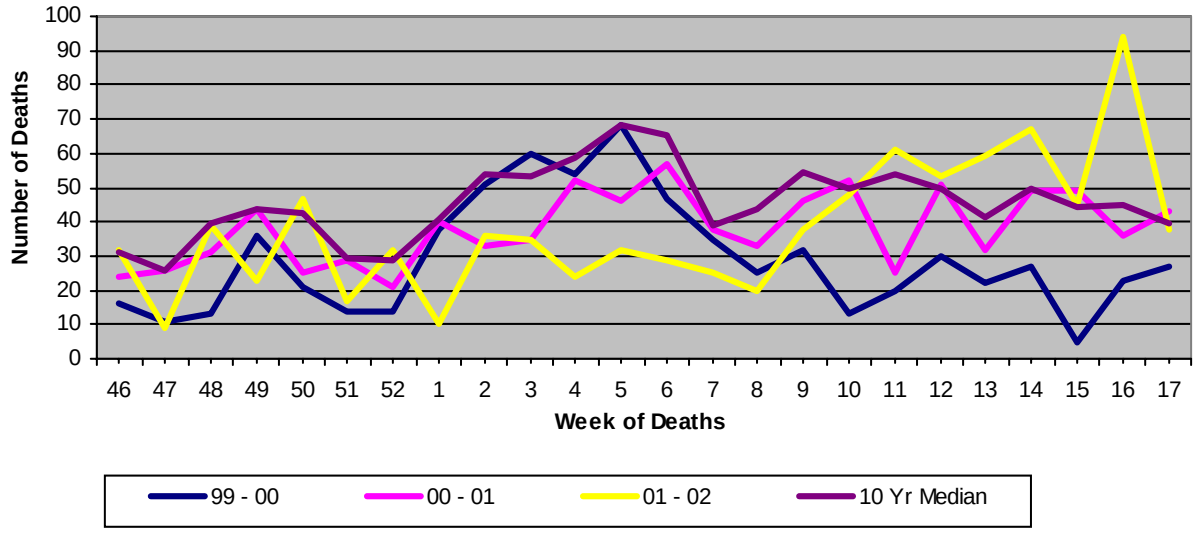
Pneumonia and Influenza (P&I) Deaths

During the 2001-02 influenza season, the numbers of pneumonia and influenza (P&I) deaths in Missouri fluctuated between 10 and 48 per week until week 11 (week ending March 16, 2002). The P&I death rate continued generally upward, then peaked during week 16 (week ending April 20, 2002) with 94 P&I deaths reported that week. A seesaw pattern with a general downward trend continued throughout the remainder of the season. Missouri P&I deaths remained below the ten-year median except during weeks: 46, 50, 52, 11, 12, 13, 14, and 16. The 2001-02 P&I mortality experienced in Missouri (1,193) appears to be higher than in 1999-2000 (900) and 2000-01 (1,188) **(See Figure 30B)**. According to CDC, the percentage of P&I deaths exceeded the epidemic threshold nationally "for 5 consecutive weeks (weeks ending March 2 [week 9] to March 30 [week 13]). During the previous three seasons, the number of consecutive weeks during which the percentage of deaths attributed to P&I exceeded the epidemic threshold ranged from 0 to 13" (weeks). The entire United States national 2001-02 influenza season summary may be reviewed in CDC's MMWR Weekly, *Update: Influenza Activity --- United States and Worldwide, 2001--02 Season, and Composition of the 2002--03 Influenza Vaccine*, June 14, 2002, June 14, 2002 / 51(23);503-506.

Figure 30B: Pneumonia and Influenza (P&I) Deaths by Week of Death, Missouri, 99-00, 00-01,01-02 Seasons and 10 Year Median



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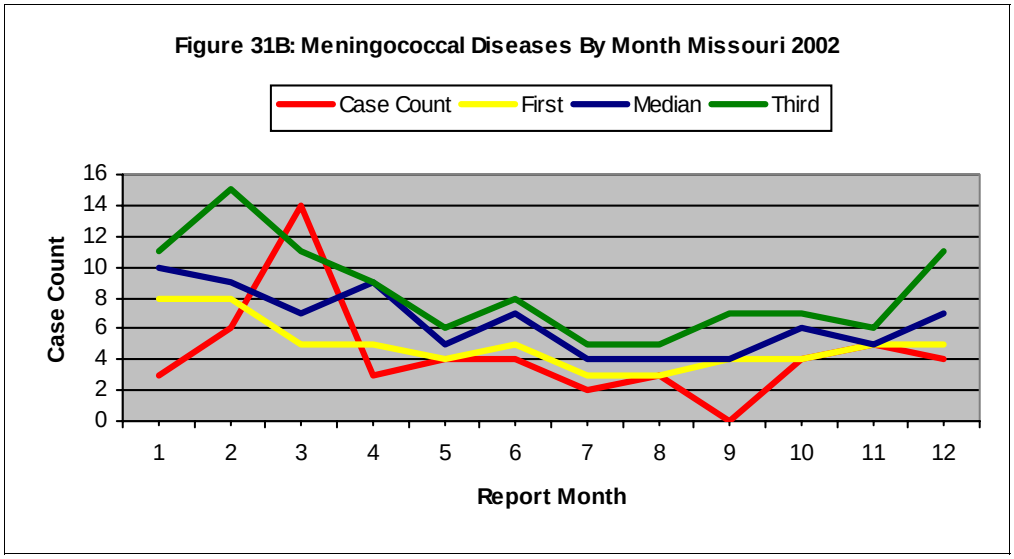
Meningococcal Disease

Neisseria meningitiditis is a gram-negative diploccoccus which can cause high fever, meningococcemia and meningitis that can become life threatening very rapidly. There are eight different serogroups of meningococcal disease, but the most common serogroups in the United States are B and C.

While this disease can cross all demographic boundaries, there is much more concern about outbreaks occurring in sites such as college dormitories or military recruit training facilities. The age groups with the largest number of reported cases in 2002 were in the 0-4 years of age group (25.0%) and 15-24 years of age group (23.1%). The race breakdown for meningococcal disease reported in 2002 was 59.6% White, 13.5% Black, and 26.9% of Unknown race.

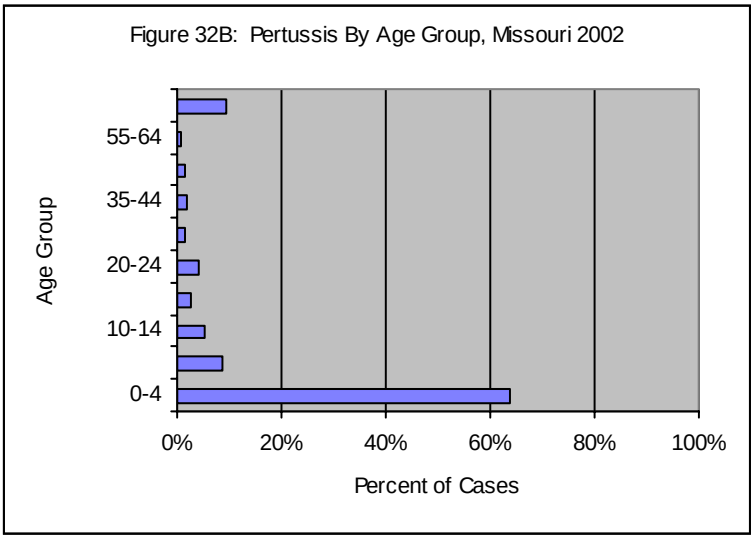


Fifty-two cases of meningococcal disease were reported throughout the year in 2002, with 14 being reported in March. The case count for 2002 is well below the median of 80 cases and the upper quartile of 94 with an incidence rate of 0.92 per 100,000. Although Missouri's rate is almost twice the national rate (0.56 per 100,000) the number of cases in Missouri for 2002 were within annual expectancy.

Mumps

Mumps is caused by a paramyxovirus. The most common symptom is swelling of the salivary glands, although serious complications such as meningitis, encephalitis and hearing loss can occur. Other complications in adults include inflammation of the testis and, rarely, sterility. There were only four cases in 2002, and all reported race as White. There were three cases in the 5-9 years of age group and one in the 10-14 years of age group. In 2002 two case were female and two cases male. One case occurred in January and the remainder were in February. Cases occurred in the Central, Northwest and Eastern parts of the state. None of the cases were epidemiologically linked. Missouri's rate of 0.07 per 100,000 is comparable with the national rate of 0.08 per 100,000.

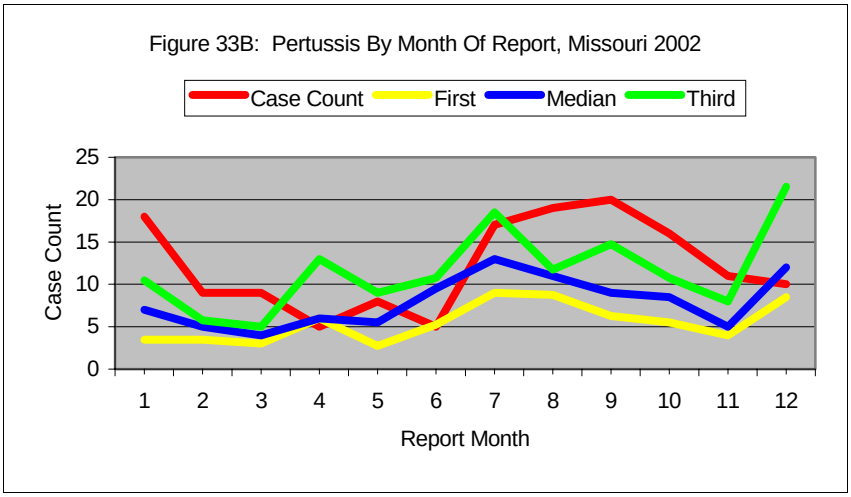
Pertussis



Pertussis is caused by the bacillus *Bordetella pertussis*. In Missouri, the 147 cases reported in 2002 were above the five-year median of 80 and the upper quartile of 97.

Of the cases where race was reported 76.9% were White, 13.6% were Black and the remainder were race unknown. Females (55.1%) predominate in this disease over males (44.9%) . Geographically within Missouri, most of the cases were reported from the Eastern Region of the state (54.4%) with 20.4% from St. Louis City, and a surprising number came from the Southeastern Region of the state with 17.7% of the cases. Missouri, with a rate of 2.59 cases per 100,000, is slightly below the national rate of 2.79 cases per 100,000. Large outbreaks of pertussis in adults occurred in Arkansas and some of the surrounding states, but a limited number of cases in adults have been reported in Missouri to date.

Of the cases reported in 2002, 71.4% were in the 0-4 years age group **(See Figure 32B)**. More importantly, during the period July through October 2002, there were 70 cases of pertussis, in which 67 cases (95.7%) were in infants (12 months or less) **(See Figure 33B)**. This incidence in infants was possibly due to the fact that immunity in pre-teens and parents/ grandparents had waned and adults and pre-teens who become re-infected tend not to have the whooping cough characteristic of young children. Some cases of illness with extended cough may not be recognized as pertussis, potentially leading to infections of those infants who do not yet possess protective antibodies from a complete vaccination series. Physicians should be aware that cases of adult pertussis are on the rise across the United States and consider pertussis in their diagnosis of adults with extended periods of cough.



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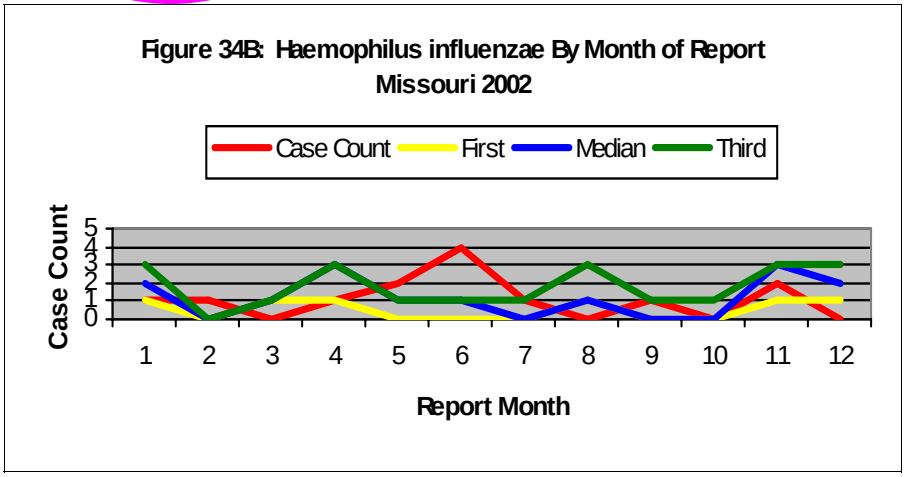
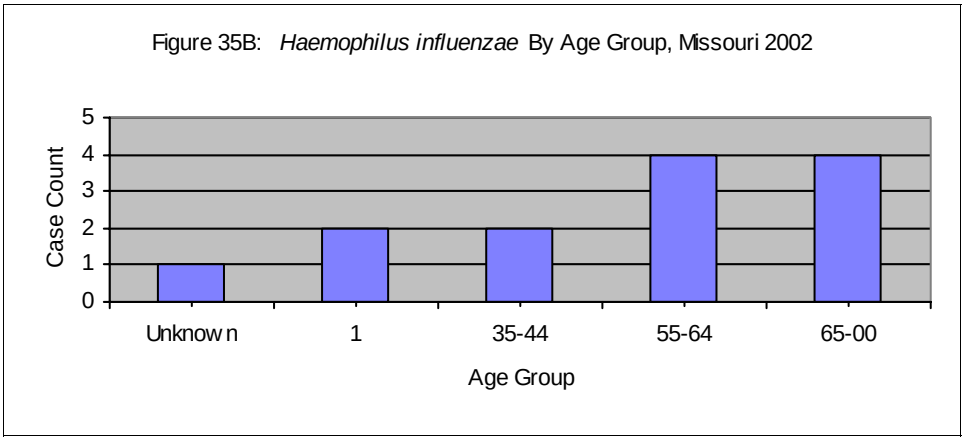
Other Communicable Diseases

Haemophilus influenzae, Invasive Disease

Haemophilus influenzae is a gram-negative coccobacilli which causes meningitis, otitis media, sinusitis, pneumonia and bacteremia. A conjugate vaccine exists that has almost eliminated *H. influenzae*, serotype B (Hib) in Missouri. Until the introduction of the vaccine, *Haemophilus influenzae* meningitis was one of the most common causes of bacterial meningitis in young children. The serotype B capsular strain was responsible for most of the invasive disease in children. We have reduced from a median of 131 cases per year in the pre-vaccine era to an average of two Hib cases per year before 1996. Since 1996, all serotypes of *H. influenzae* (including Hib) have increased from a low of eight to a high of 20.



Thirteen cases of *Haemophilus influenzae* were reported in 2002 **(See Figure 34B)**. This is below the five-year median of 14 and the upper quartile of 20 cases. Three of the cases were serotype B; however these occurred in individuals older than fifty. One was serotype E and the remainder were untypable or unknown serotype. Blacks accounted for 15.38% of the cases, Whites 46.15% and the rest were race unreported. Of the cases where age was reported, two were less than one year old, two were between 35-44 years of age and eight (61.54%) were over 55 years of age **(See Figure 35B)**. Females (53.85%) outnumbered males (38.46%) and one case was gender unknown. Cases were reported from January through November with the largest number of reported cases from the eastern half of the state **(See Table 6B)**.



Missouri's rate of 0.23 per 100,000 is less than half the national rate of 0.51 per 100,000, but concern is growing over the number of positive blood cultures being reported in older individuals in Missouri.

Table 6B: Counties Reporting *Haemophilus influenzae* 2002	Percent of Total
BATES	7.69%
GREENE	7.69%
HENRY	7.69%
KANSAS CITY	7.69%
ST CHARLES	7.69%
ST LOUIS	38.46%
ST LOUIS CITY	23.08%

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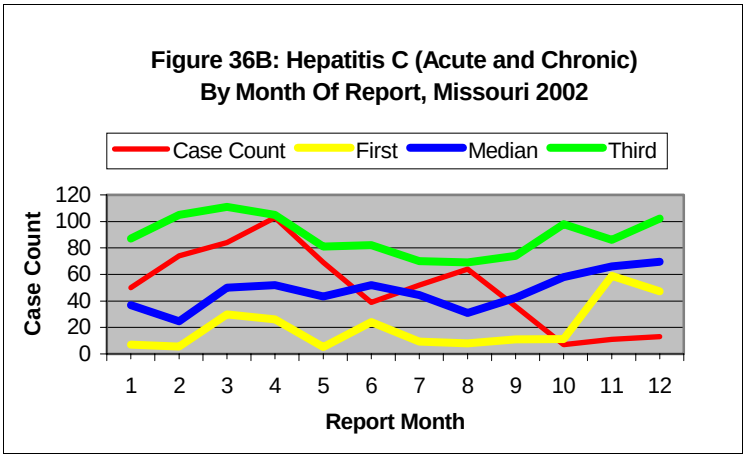
CD: Other

Hepatitis C, Acute and Chronic

Hepatitis C (HCV) is a disease of the liver caused by the Hepacavirus. Signs and symptoms associated with acute illness may include jaundice, fatigue, dark urine, abdominal pain, loss of appetite, nausea and diarrhea. Chronic disease can occur in 75%-85% people who become infected. Of those who develop chronic infection, 70% may progress to liver disease, of which 15% develop cirrhosis of the liver within 20-30 years and approximately 3% die from chronic infection.



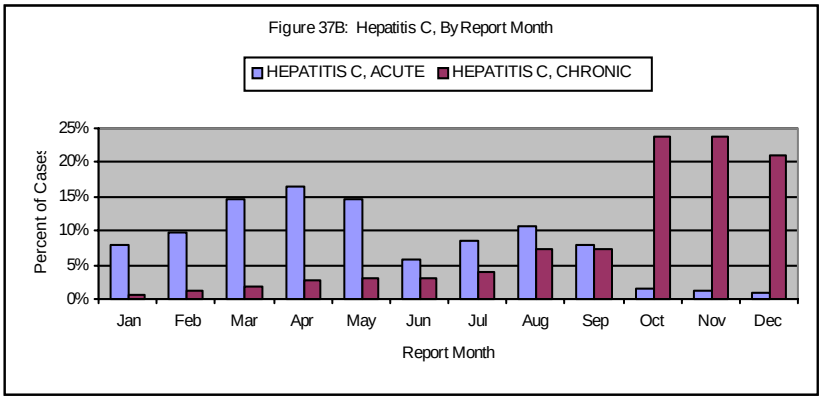
Acute HCV and chronic HCV are reportable diseases in Missouri. Prior to 2002, chronic HCV was not a reportable disease, so it was not listed as a separate entity in our database. At that time, many of these cases were listed as a "suspect" case rather than a "probable" or "confirmed" case and were not included in our statistics. This change in reporting makes the current median, upper quartile, and lower quartile for HCV of limited value until five years of complete data is gathered.

There were 1,400 cases of HCV (acute and chronic combined) reported in Missouri for 2002 **(See Figure 36B)**. Of these, 0.07% were Native American, 2.79% Black, 24.64% White, and 72.50% were race unknown. As with Hepatitis B, older age groups are heavily represented in Missouri data, with the largest group being those 45-54 years of age. However, unlike Hepatitis B, cases in those younger than five years of age have been reported **(See Table 7B)**.

Table 7B: Hepatitis C, By Age Group	Percent of Total
0-4	0.50%
5-9	0.14%
10-14	0.50%
15-19	1.21%
20-24	2.71%
25-34	8.86%
35-44	30.93%
45-54	39.93%
55-64	8.43%
65+	5.21%
UNKNOWN	5.57%

There is a 58.25% to 39.5% male to female split in gender for HCV, with the remainder as gender unknown. There appears to be a seasonality for HCV, with more chronic cases occurring in the fall and winter months, while acute disease seems to occur more often in the spring **(See Figure 37B)**.

Geographically, the largest number of cases were reported in St. Louis City with 14.29%. Kansas City followed with 11.21%, Greene County had 11.50%, and St. Louis County reported 10.57% of cases.



In 2002, Missouri's rate per 100,000 of 10.76 cases is much higher than the national rate per 100,000 of 1.27. This is due to Missouri incorporating "probable" cases into statistics and the remainder of the nation not doing so until 2003. For the previous five years in Missouri, using the former case definition for HCV, rates ranged from a low of 0.10 per 100,000 to a high of 0.66 per 100,000, which was comparable to national figures.

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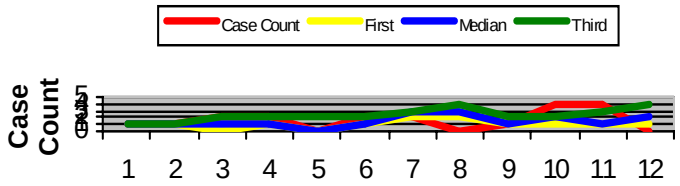
Legionellosis

There were 19 cases of legionellosis in 2002, slightly below the five-year median of 22 and below the upper quartile of 26 cases **(See Figure 38B)**. Of these cases, 63.2% were White, 10.5% were Black, and the remainder were race unknown. Incidence by age group: 63.2% were 55 years of age and older; 15.8% were in the 35-44 years of age group; and 21.1% were in the 45-54 years of age group. Legionellosis was not reported in persons less than 38 years of age, and females outnumbered males 52.6% to 47.4%.

Cases were reported from January through November with a surge (21.1%) of cases reported in October, which affected persons 55 years of age and older. It is unclear why this small spike of incidence occurred. Geographically, cases were reported from the Central, Southwestern, and Eastern regions of the state. Missouri's rate of 0.33 per 100,000 is slightly below the national rate of 0.41 per 100,000.

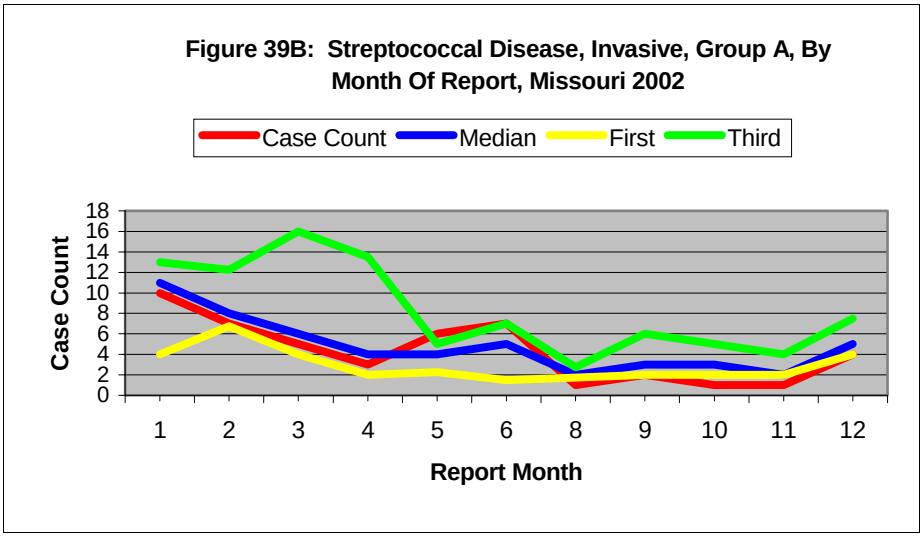
Figure 38B: Legionellosis By Month of Report Missouri 2002



Streptococcal Disease, Invasive, Group A

Streptococcal Disease, Invasive, Group A, is usually responsible for strep throat, otitis media and sinusitis, but can also express itself as more serious conditions such as Scarlet Fever, Rheumatic Fever, necrotizing fasciitis and Toxic Shock Syndrome. Forty-seven cases of Streptococcal Disease, Invasive, Group A, were reported in 2002, which is above the five-year median of 45 but below the upper quartile of 63 cases **(See Figure 39B)**.

Figure 39B: Streptococcal Disease, Invasive, Group A, By Month Of Report, Missouri 2002



Race was reported in 53.2% of cases as White, 4.3% as Black, and the remainder unknown. Young children are susceptible to invasive disease, but the majority of cases (68.1%) of invasive disease occurred in those 55 years of age and older.

There were no significant differences in cases reported by gender as males (51.1%) slightly outnumbered females (48.9%). January (17.0%) and February (17.0%) had the highest incidence rates for disease; however, cases were reported throughout the year. Nineteen counties in the state reported Streptococcal Disease, Invasive, Group A, with St. Louis County having the greatest percentage of cases (36.2%). Missouri's rate of 0.83 per 100,000 versus the national rate of 1.38 could reflect confusion by physicians as to whether this invasive condition is reportable in Missouri.

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Mycobacterium Tuberculosis (MTB)

In 2002, a total of 136 cases of *Mycobacterium tuberculosis* (MTB) were reported in Missouri. This is a decrease of 13.4% from 2001 and a 46.9% decline from 1993 **(See Figure 40B)**. Since 1993, the case rate (per 100,000) in Missouri has declined from 5.4 cases per year (per 100,000) to 2.4 cases per year (per 100,000), representing on average a decline of 0.26 case per year (per 100,000) **(See Figure 41B)**. Likewise, the nation is showing a decline of 5.7% in 2002 (15,078 cases) in the number of *M. tuberculosis* cases being reported to CDC compared to the number reported in 2001 (26,673). This is a 43.3% decline from the 1992 peak of the TB resurgence. [1] Even with the overall decline in the number of cases reported, a substantial difference in the rate of decline between U.S. born, foreign-born and Black/African American population exist.

Figure 40B: Reported TB Cases in Missouri 1993 - 2002

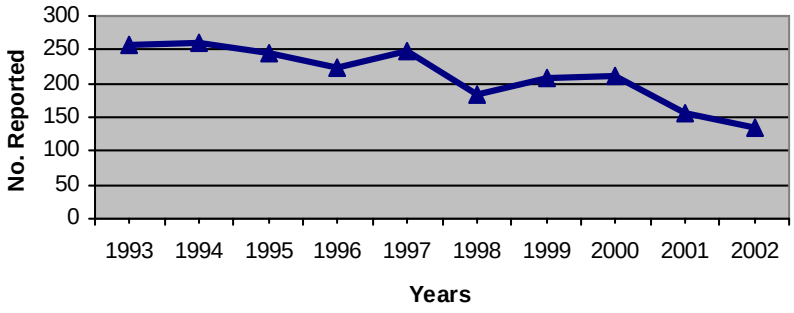
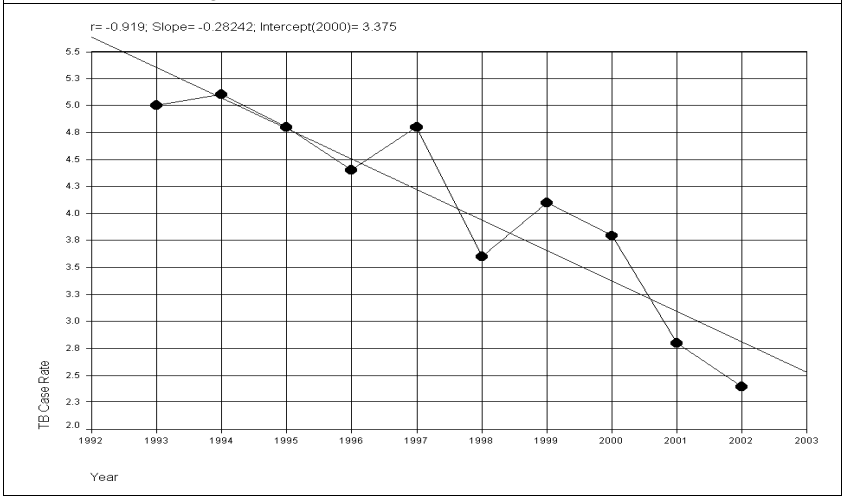


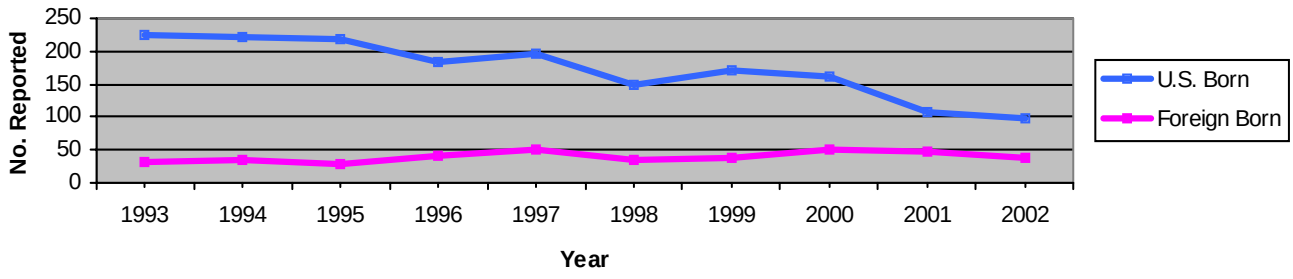
Figure 41B: Missouri TB Case Rate 1993—2002



Over the past ten years there has been a 56.9% decrease of TB reported among U.S. born population, a 10.2 % decline in 2002 (97) from 2001 (108), while the foreign-born population is increasing. From 1993-2002, the number of cases among foreign-born has increased by 25.8%, tripling the ratio of foreign-born to U. S. born from 0.138:1 in 1993 to 0.402:1 in 2002 **(See Figure 42B)**.

1 *MMWR*, Morbidity and Mortality Weekly Report, March 21, 2003/Vol. 52/ No. 11

Figure 42B: TB Disease Reported in U.S. Born and Foreign Born From 1993 - 2002



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CD: Other

Figure 43B: Reported Cases of TB by Race 1993 - 2002

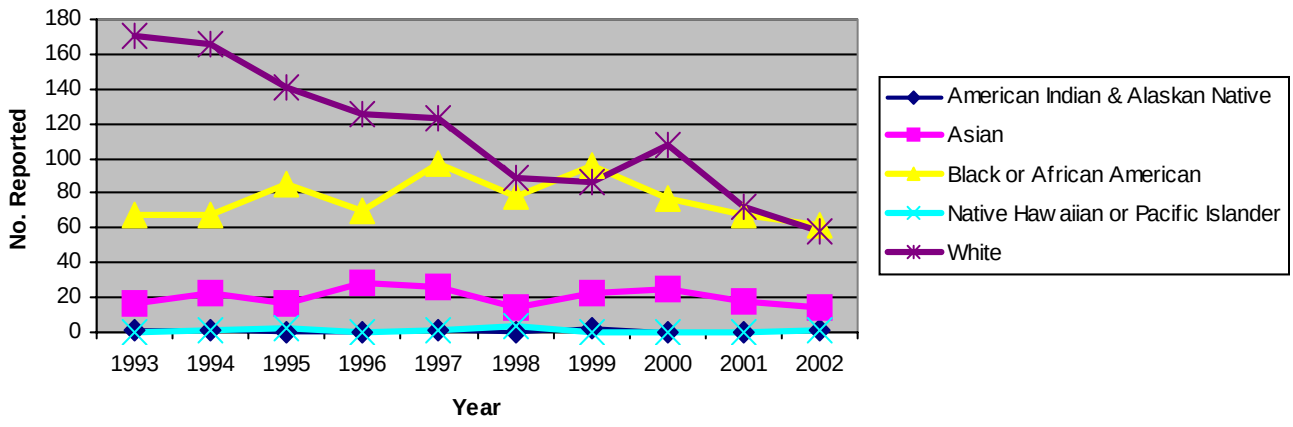


Figure 44B: TB Cases Reported by Race 2001

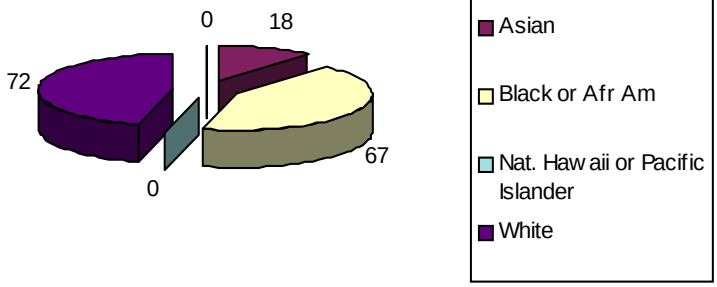
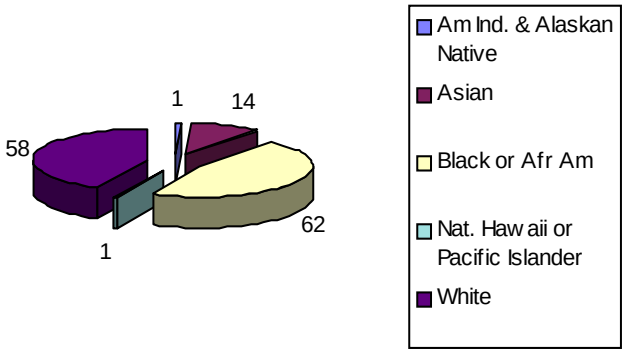


Figure 45B: TB Cases Reported by Race 2002



Over the past 10 years (1993-2002), the case rate of TB reported in the Black/African American population declined 8.82%, while the rate declined in the White population by 65.88% and in the other race population by 10.2%. The Black/African American population represents 36.11% of the cases since 1993, while the White population represents 53.67% and the other race population represents 78.57% of TB reported **(See Figure 43B)**.

In 2002, a total of 62 TB cases were reported in the Black/African American population, representing a 7% decrease from 2001 (67). There was a decrease of 19% in the White population in 2002 (58) from 2001 (72). Cumulatively in the other race populations, there was an 11% decrease in 2002 (16) from 2001 (18) **(See Figures 44B and 45B)**.

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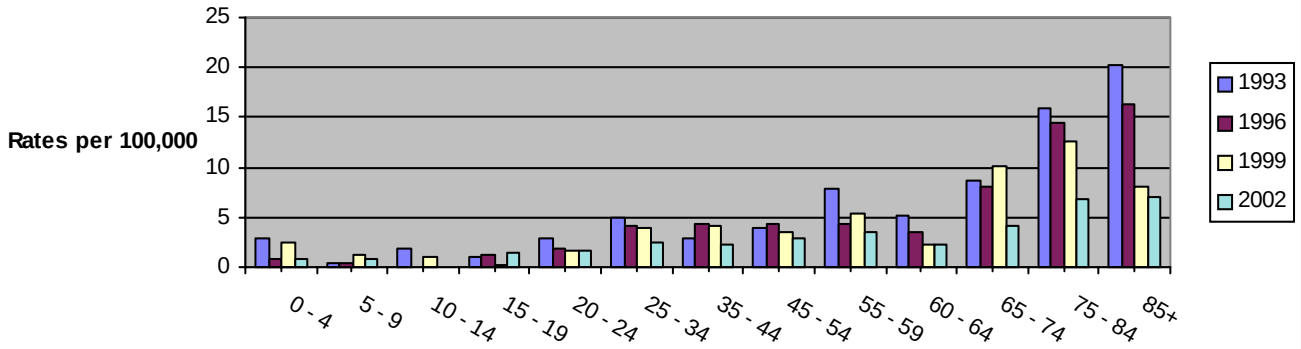
CD: Other

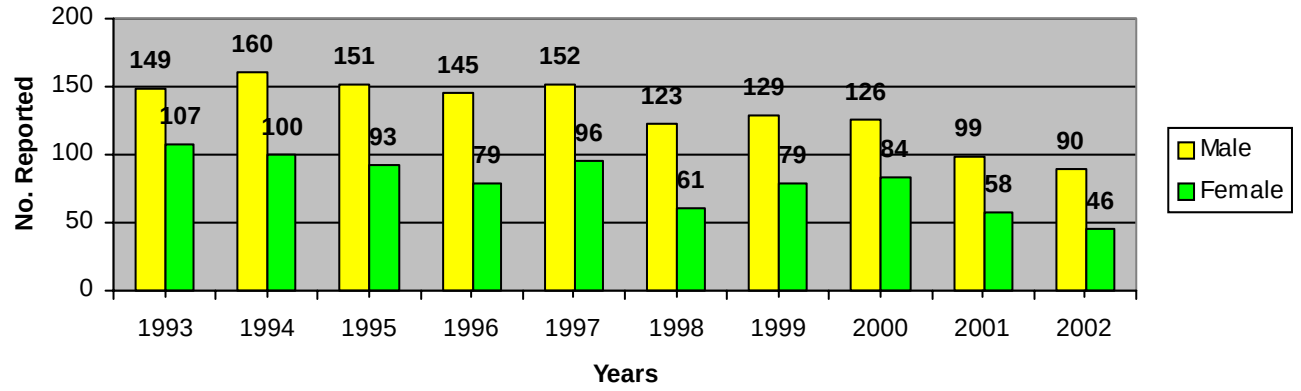
The TB Disease Attack Rate by Age Group as shown in **Figure 46B** indicates that cases reported (per 100,000) over the years have remained relatively the same, with only a slight rise in numbers of certain age groups for certain years.

Figure 46B: TB Disease Attack Rate by Age Group



In 2002, 90 (66.18%) TB cases were reported as male, while 46 (33.82%) were female. This represents a 10% decrease in the number of cases in males and a 21% decrease in the number of cases in females reported compared to the previous year. The ratio of males to females has increased from 1.39:1 in 1993 to 1.96:1 in 2002 **(See Figure 47B)**. Historically, the ratio of males to females, from 1993 to 2002, is 1.65:1.

Figure 47B: TB Reported by Gender 1993 - 2002



Great strides have been made to eliminate TB in the United States and globally, but additional emphasis is necessary to further reduce TB worldwide to meet the goal set by the World Health Organization of eliminating TB by the year 2010.

Section C:
Environmental

ENVIRONMENTAL SURVEILLANCE

Environmental and occupational diseases and conditions have been reportable to the state since legislation mandating such reporting was enacted in 1993. The reporting of environmental and occupational diseases is a growing component of the overall surveillance effort of the OoS. The OoS is statutorily responsible for conducting surveillance, analysis, and generating reports on 12 different categories of environmental and occupationally-induced diseases and conditions. To date, due to several sets of circumstances, the majority of environmental and occupational diseases and conditions are not reported as thoroughly as the OoS needs to accurately track, develop reports, and make predictions on environmental conditions. The major cause of under reporting appears to be the lack of knowledge by mandated reporters of these 12 categories.

There is adequate information and data in the categories of Adult Blood Lead levels, Childhood Blood Lead levels, Hazardous Substances, Emergency Events, Carbon Monoxide Poisoning, Hyperthermia, and Hypothermia to accurately analyze and then generate reports. Reports on these diseases and conditions are provided on the subsequent pages.

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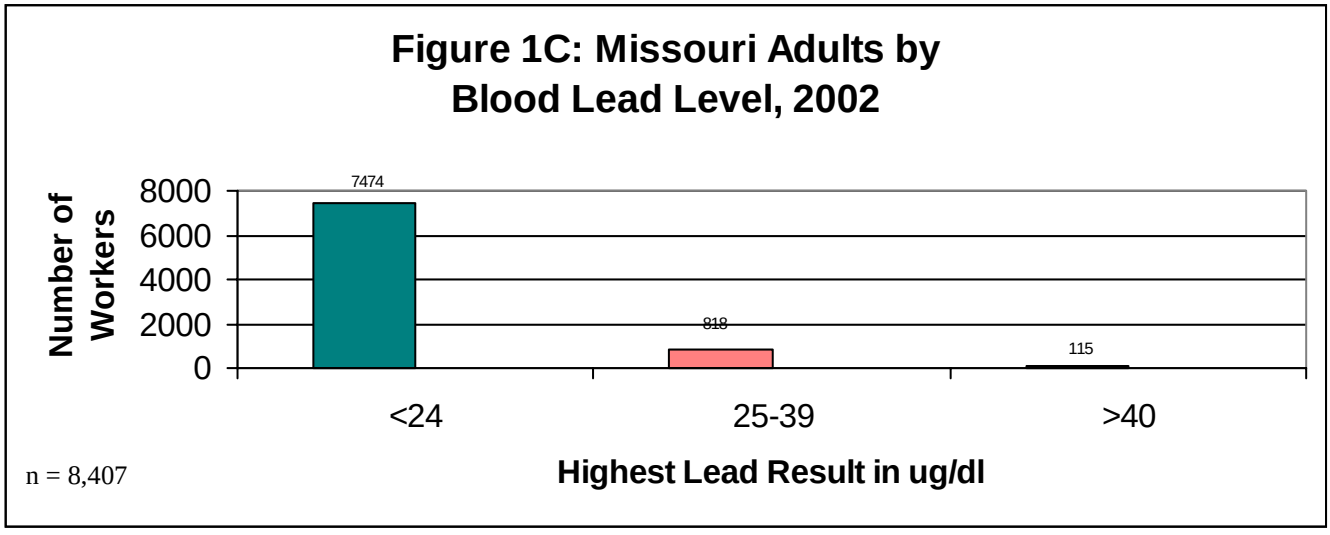
Missouri Adult Blood Lead Surveillance and Epidemiology Program

The Missouri Adult Blood Lead Surveillance and Epidemiology (ABLES) Program receives funding from the CDC. The goal of this program is the elimination of all cases of workplace-induced lead elevations greater than or equal to (≥)25 micrograms of lead per deciliter of whole blood (µg/dL) in adults by the year 2010. States collect and analyze data on cases of elevated blood lead levels in individuals age 16 years and older. The majority of lead elevations in this population are believed to be due to exposures in the workplace. Non-identifying data are reported by states to the National Institute for Occupational Safety and Health (NIOSH) for national surveillance purposes. In 2001, the 25 states participating in the ABLES program reported a total of 9,943 adults with elevated lead levels. The two states with the most elevations were Pennsylvania (2,113) and Ohio (1,572). The following preliminary report indicates, of the states which collect ABLES data, Missouri is likely to be the third highest in the number of lead poisoned adults.

The DHSS, OoS, first received funding from the NIOSH in Fall 2001 to collect and report ABLES data. This preliminary report summarizes calendar year 2002 data. Records with incomplete data, particularly age and county of residence, will be re-analyzed by the Missouri ABLES (MO ABLES) program when the missing information is obtained.

There were 14,171 blood specimens drawn, analyzed, and reported to the MO ABLES program for individuals age 16 years and older in 2002 and December 31, 2002. Blood specimens drawn but not analyzed were excluded. There were 2,130 adults tested more than once during the year.

Analysis of the MO ABLES data revealed 8,407 unduplicated individuals were tested in 2002. Blood lead level determination is based upon their highest reported blood lead level during the 2002 time frame. Of these, 7,474 (88.9%) had lead levels <25 µg/dL. There were 818 (9.7%) reported with lead levels between 25 µg/dL and 39 µg/dL, and 115 (1.4%) whose highest level was 40 µg/dL or above **(See Figure 1C)**.



In total during 2002, 933 (11.1%) of all individuals tested had at least one blood lead test at or above 25 µg/dL, the CDC's lead level of concern for non-pregnant adults.

Of the 933 adults with elevated blood lead levels in 2002, the MO ABLES program had date of birth or age information on 659 (70.6%). Of individuals with a known age, there were 654 (99.2%) between 18 and 64 years of age at the time their blood specimen was drawn. There were 4 (0.4%) adults in the age range of 65 through 74 years of age, and only one (0.1%) person more than 74 years old. During this time, there were no 16 or 17 year-olds with an elevated blood lead level. Age was not known for 274 (29.4%) of the individuals with blood lead levels ≥25 µg/dL **(See Figure 2C)**. Date of birth and/or age on incomplete records has been requested. **Figure 3C** illustrates that 821 (88.0%) adults with elevated blood lead levels were male, females comprised 73 (7.8%), and 39 (4.2%) were unknown.

Figure 2C: Adults with Elevated Blood Lead Levels by Age, 2002

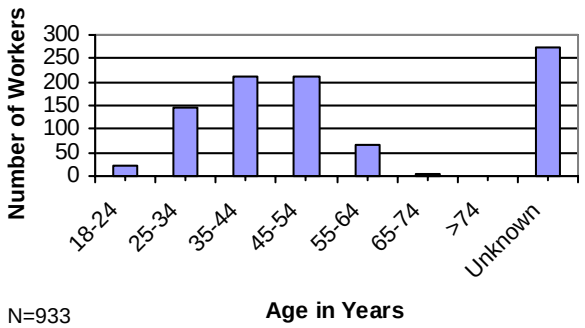
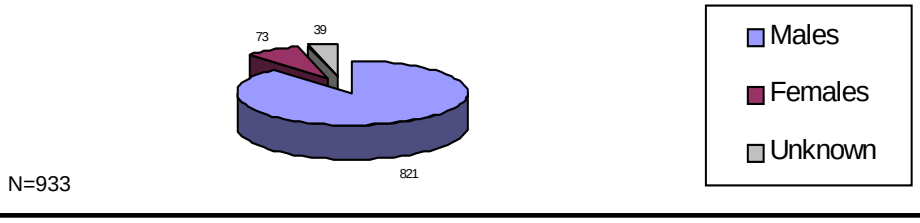


Figure 3C: Adults with Elevated Blood Lead Levels by Gender, 2002



For the 230 individuals with a reported race, 222 (96.5%) were White, six (2.6%) were Black, and two (0.9%) were Native American or Alaskan Native. None were reported as Asian or Pacific Islander. Of 231 adults with elevated blood lead levels with a reported ethnicity, 226 (97.8%) were Non-Hispanic and five (2.2%) were Hispanic. However, as indicated in **Figures 4C and 5C**, race and ethnicity are not known for the majority of adults with elevated blood lead levels.

Figure 4C: Adults with Elevated Blood Lead Levels by Race, 2002

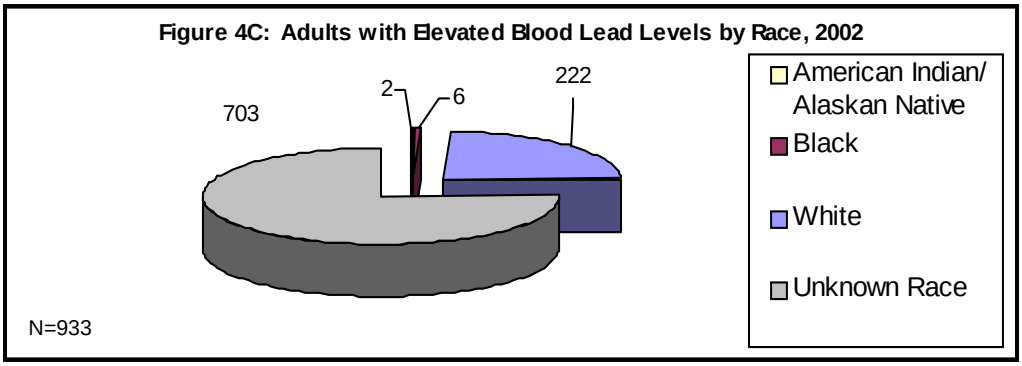
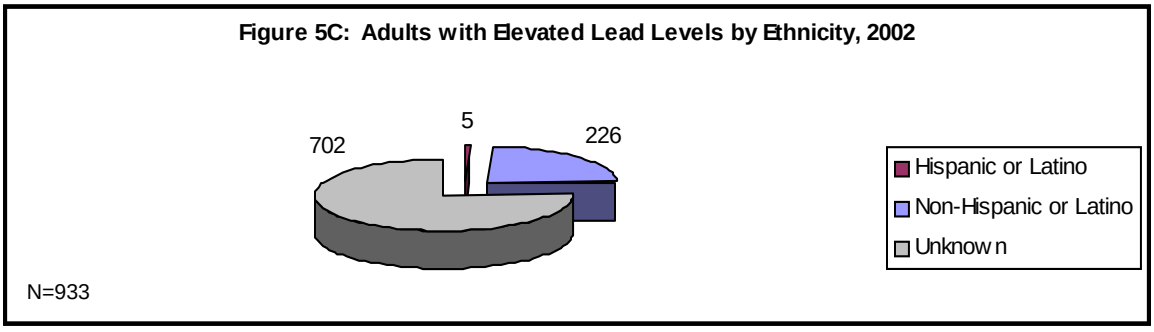


Figure 5C: Adults with Elevated Lead Levels by Ethnicity, 2002



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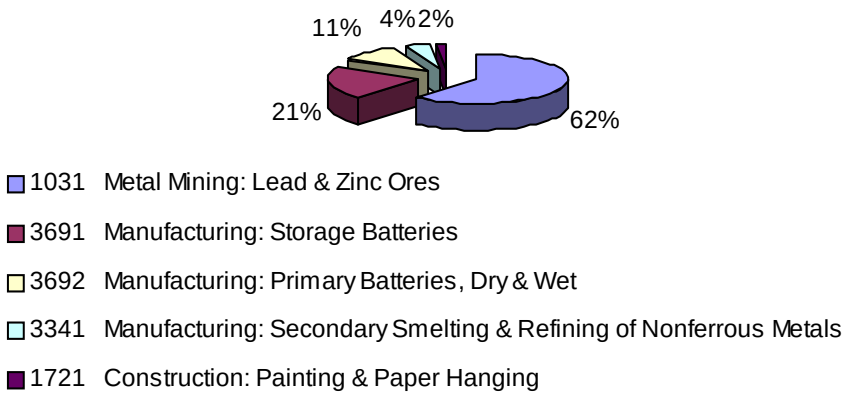
Of the 933 individual records with blood lead levels ≥25 µg/dL drawn in 2002, 916 (98.2%) have a known employer and Standardized Industry Code (SIC). Five industries represented 842 (91.9%) of these workers. The industries with the largest numbers of blood lead-elevated employees are shown in **Figure 6C**.

Figure 6C: Top Five Industries with Lead-Elevated Workers, 2002



A worker's place of employment is assumed to be their source of exposure unless other source information, such as an exposure by hobby, is received.

Lead battery manufacturing, mining, smelting, and other related industries are an important part of Missouri's economic base. Some of the world's largest known lead deposits are located in Missouri, and mining has been ongoing since the 1700s. While lead is a great economic resource, lead in the human body is a health hazard. Missouri's largest lead industries provide community education and services, as well as testing their employees regularly for lead elevations. These companies also cooperate in providing demographic information to aid the MO ABLES program in data collection. The MO ABLES database includes 783 (83.9%) records with a known county of employment for the 933 workers with a blood lead elevation. The majority of these workers are employed in the metropolitan and southern areas of Missouri, although there are 56 (7.2%) working in an adjacent Kansas county **(See Figure 7C on page 51)**.

Table 1C: Lead-Elevated Workers by Industry, 2002

SIC Division	*Standard Industry Code (SIC)*	*SIC Label*	*# Workers Elevated ≥25 ug/dL*
Metal Mining	1031	Lead & Zinc Ores	520
Manufacturing	3691	Storage Batteries	175
Manufacturing	3692	Primary Batteries, Dry & Wet	96
Manufacturing	3341	Secondary Smelting & Refining of Nonferrous Metals	35
Construction	1721	Painting & Paper Hanging	16
Various	Various	All other Standard Industry Codes combined	74
Total			916

Particularly in rural areas of Missouri, workers commute across county boundaries to reach their places of employment. Analysis of this trend is impaired because laboratory data often does not include a worker's home address. Of the 783 elevated workers for 2002 with a known county of employment, only 392 (50.1%) included a county of residence. The MO ABLES program has requested home address information for those workers with a known employer. Workers who are employed out of state are included in MO ABLES if they are known to reside in Missouri. In the 2002 data set there were 917 workers whose address of employment was known. Of these 917, there were 56 (6.1%) Missouri residents with elevated blood lead levels who were employed in Kansas, 17 (1.9%) in Iowa, two (0.2%) in Illinois, and one (0.1%) in Oklahoma. The remaining 841 (91.7%) elevated workers are employed in the state of Missouri. There were 13 elevated worker records missing an identifiable employer or SIC code, but for whom an occupation or other source was known. These sources included renovating an old home (4), repairing radiators (4), painting (2), refurbishing stained glass windows (1), using firearms (1), and melting lead for fishing weights (1). Employment or source information on four workers was not available **(See Table 1C).**

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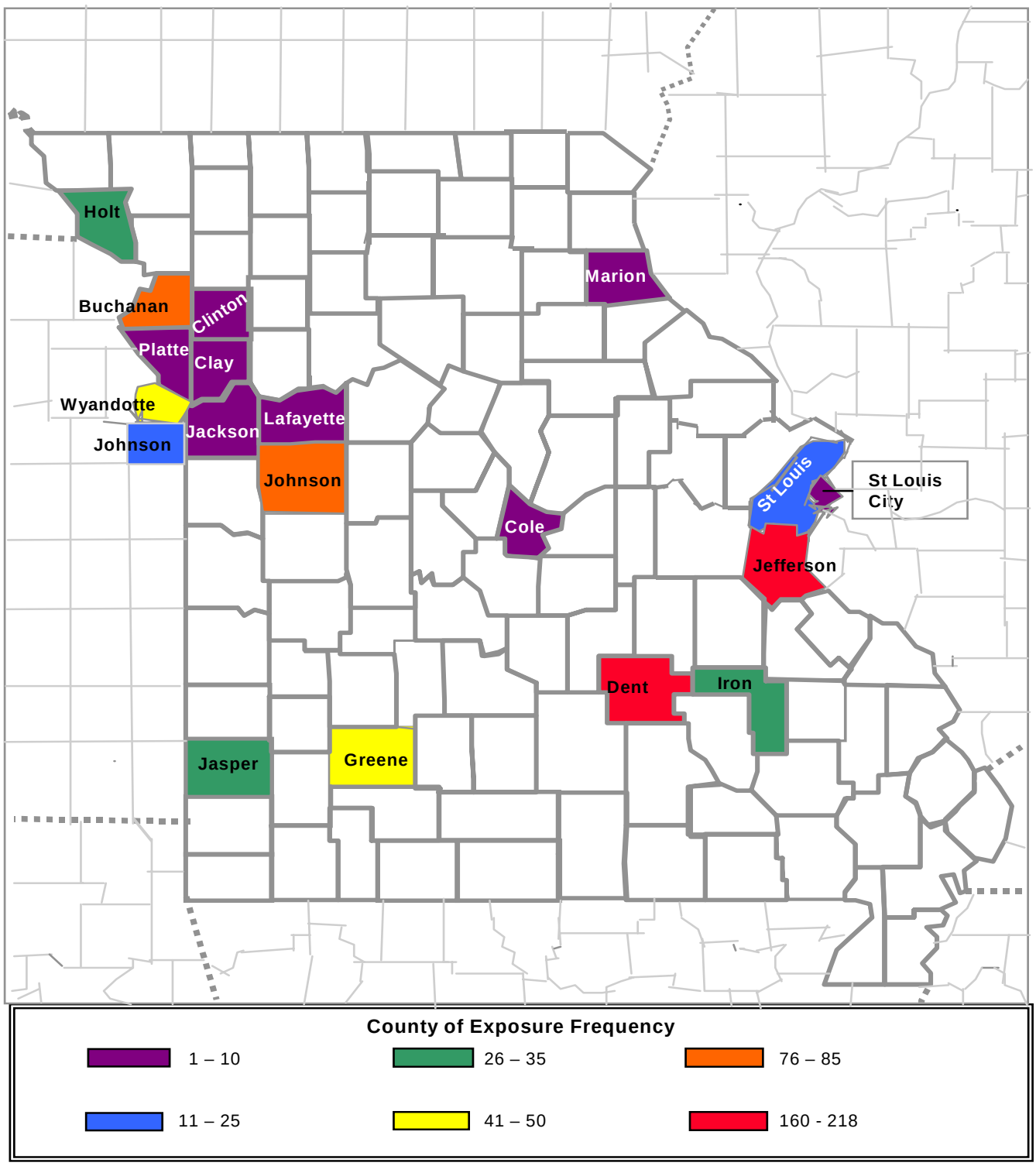
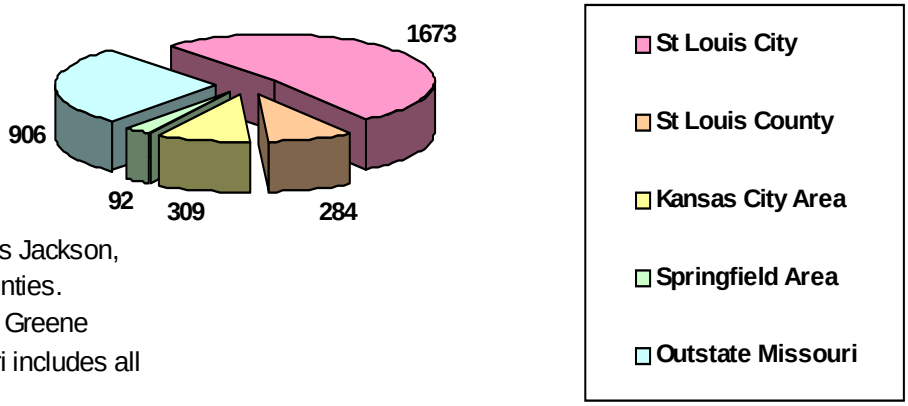
Figure 7C: Blood Lead Levels 25 (ug/dl) or Greater By County of Exposure: 2002



Missouri Childhood Lead

Childhood lead poisoning is a major environmental health problem in Missouri. Lead poisoning causes adverse effects on cognitive development, behavior and growth of children. The program in Missouri serves children less than six years of age. In 1993, the state of Missouri began electronically collecting information on blood lead testing and in 2000 all blood lead tests regardless of age or lead level were required to be reported to DHSS. The increased quantity and quality of blood lead data for Missouri has enabled the department to determine high-risk areas in the state. Policies and guidelines describe the proper treatment for children with elevated blood lead levels of ten micrograms per deciliter (µg/dL) and greater.

Figure 8C: 2002 Elevated Blood Lead Levels in Children (greater than or equal to 10µg/dL)



Kansas City Area includes Jackson, Clay, Platte, and Ray Counties. Springfield Area includes Greene County. Outstate Missouri includes all other Missouri Counties.

In the past six years of blood lead data analysis, the number of children poisoned (blood lead levels $\geq$ 10 µg/dL), has declined from 14% to 5% in Missouri. In calendar year 2002, 65,220 children, or 15% of the population less than six years of age, were tested for lead poisoning **(See Figure 8C)**. Although the percentage of the population tested remained the same for 2001 and 2002, the number of children with elevated blood lead levels $\geq$ 10 µg/dL decreased state-wide from 6% to 5%, or 3,264 children.

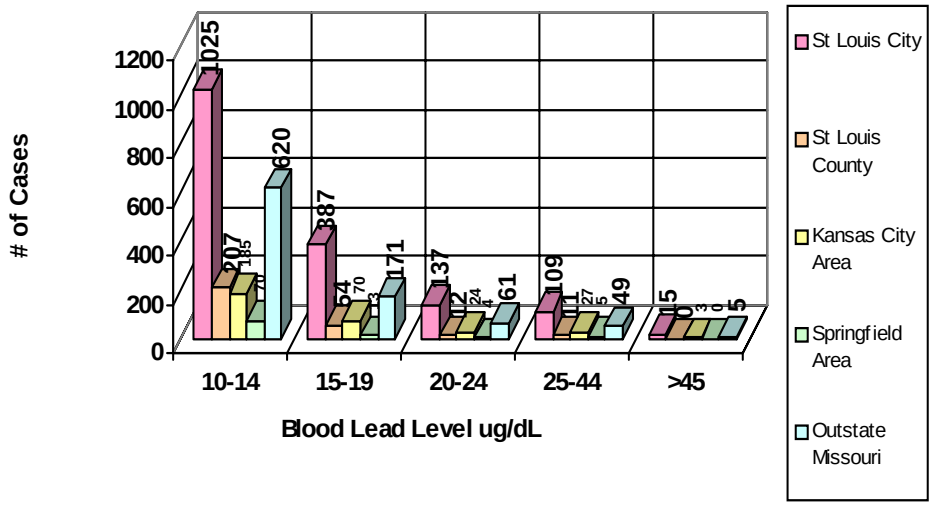
At the national level, the proportion of children with elevated blood lead levels (EBL) has also declined over time. National blood lead testing surveillance data is expected to be published by the CDC 2004. The National Health and Nutrition Examination Survey (NHANES, a periodic population survey conducted since 1960) collects data on the health and diet of people in the United States. NHANES II data from 1976 to 1980 shows the geometric mean blood lead level for children between the ages of 1-5 years of age in the United States is 15 µg/dL. NHANES III, Phase 2, from 1991 to 1994, showed a decline in the geometric mean to 2.7 µg/dL. Data from NHANES IV, from 1999 to 2000, has shown yet another decrease in the geometric mean from 2.7 µg/dL to 2.2 µg/dL, which suggests a further decline in the number of children with elevated blood lead levels.[1]

Most states, including Missouri, have reported reductions in rates of childhood lead poisoning. According to a Morbidity and Mortality Weekly Report (MMWR) article [2], a recent report showed that among children less than six years of age who received blood lead tests in 19 states during 1997-1999, there was an average decrease in the percent of children with elevated blood lead levels, from 10.5 % in 1997 to 7.6 % in 1999. The data showed that the proportion of children tested with blood lead levels ≥10 µg/dL decreased from 10.5% in 1996 to 7.6% in 1998 in the 19 states that provided data.

The current CDC recommendation is to target high-risk areas within the state for childhood lead poisoning prevention services. This requirement has prompted DHSS to use their geographic mapping capability to pinpoint and share the information on areas of the state with a high concentration of at risk children.

St. Louis City represents 6% of the population less than six years of age in the state; however, they report 49% of the lead-poisoned children in Missouri **(See Figure 9C)**. The OoS developed a pilot program in 2002 for geocoding the EBL data collected from St. Louis City in 2001. All locations of the children tested were placed on the map based on their address using a Geographical Information Systems (GIS) technique called geocoding. These results were then used to create a spatial analysis. The information obtained by this analysis showed a large concentration of cases in the southern portion of St. Louis City. Additional information obtained and spatially displayed for this project includes all testing information (both negative and elevated results) and historical lead smelter site information **(See Figure 10C on page 54).**

Figure 9C: 2002 Elevated Blood Lead Levels in Children



Kansas City Area includes Jackson, Clay, Platte, and Ray Counties. Springfield Area includes Greene County. Outstate Missouri includes all other Missouri Counties.

[1]Centers for Disease Control & Prevention, National Center for Environmental Health, *Children's Blood Level in the United States*, Retrieved July 18, 2003 from http://www.cdc.gov/nceh/lead/research/kidsBLL.htm

[2] Centers for Disease Control & Prevention, *Morbidity and Mortality Weekly Report,* December 22, 2000/49(50); 1133-7

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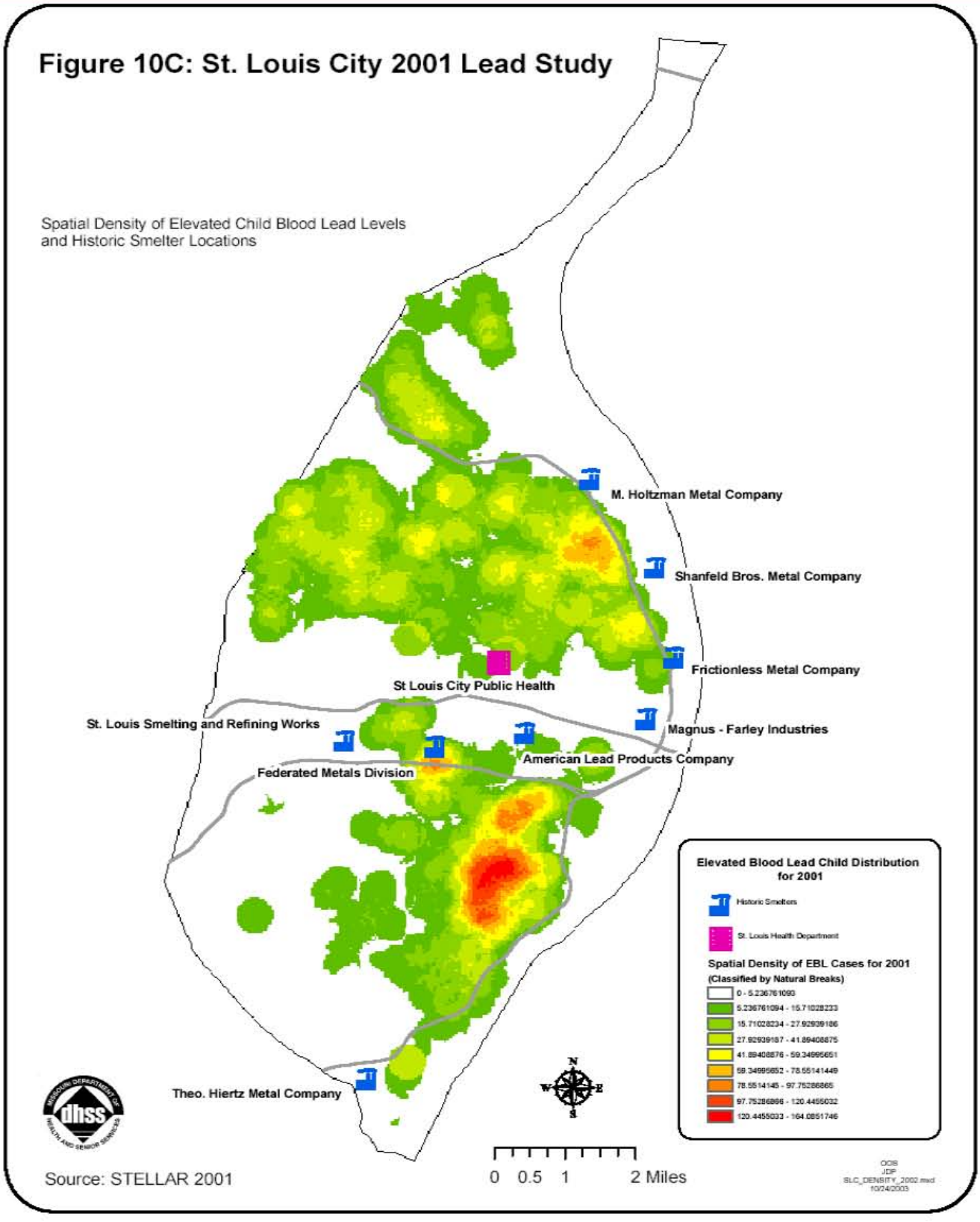
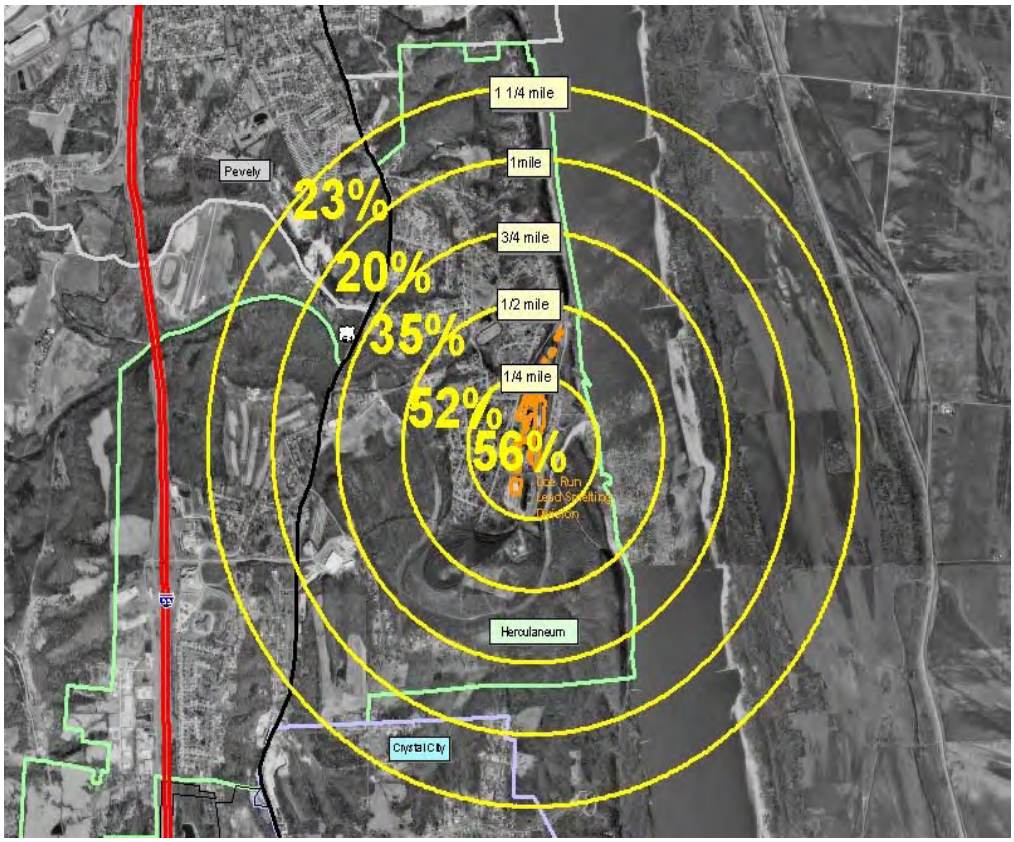


Figure 10C: St. Louis City 2001 Lead Study
Spatial Density of Elevated Child Blood Lead Levels
and Historic Smelter Locations
M. Holtzman Metal Company
Shanfeld Bros. Metal Company
Frictionless Metal Company
St Louis City Public Health
St. Louis Smelting and Refining Works
Magnus - Farley Industries
American Lead Products Company
Federated Metals Division
Theo. Hiertz Metal Company
Elevated Blood Lead Child Distribution
for 2001
Historic Smelters
St. Louis Health Department
Spatial Density of EBL Cases for 2001
(Classified by Natural Breaks)
0 - 5.236761093
5.236761094 - 15.71028233
15.71028234 - 27.92939186
27.92939187 - 41.89408875
41.89408876 - 59.34995651
59.34995652 - 78.55141449
78.5514145 - 97.75286865
97.75286866 - 120.4455032
120.4455033 - 164.0851746
N
W
E
S
0 0.5 1 2 Miles
Source: STELLAR 2001

Another project was the geocoding of cases in Herculaneum, Missouri, located approximately 26 miles southwest of St. Louis. Herculaneum is located in one of the world's richest lead regions and contains one of the largest lead smelters in the world. Children in the town regularly tested positive for elevated blood lead levels. It had been suggested that those children who lived closer to the smelter were testing positive for elevated lead levels at a higher rate than children who lived further away. GIS provided the necessary tools to answer this question.

All of the locations of the children tested were placed on the map based on their address. Concentric rings centered on the smokestack of the smelter were created at ¼ mile intervals. These rings were overlaid with the point locations of the elevated blood lead tests. The rate of elevation for each ¼ mile buffer was then computed. This technique revealed that children within ½ mile of the smelter had much higher rates of elevated blood lead levels than children that lived beyond ½ mile. The results from this project were presented to the smelter company and led to the purchase of 160 homes within ½ mile of the smelter, where children under the age of six lived **(See Figure 11C)**.

Figure 11C: Herculaneum Smelter Site



It is estimated that childhood lead poisoning still affects approximately 434,000 children nationwide. The technological advances in locating and analyzing areas of high risk, the passage of laws in the 1970's and 1980's that prohibited the use of lead in gasoline, paint, food cans and other consumer products, and the passage of Senate Bill 266 in 2001 that mandates universal testing of children in high risk areas will be beneficial in lowering Missouri's number of children with elevated blood lead. Missouri has a significant percentage of housing (28%) built before 1950, when lead paint was in widespread use. Missouri is the nation's number one producer of lead. These and other emerging factors will continue to present a public health challenge in addressing childhood lead poisoning.

Hazardous Substances Emergency Events Surveillance

A total of 394 events meeting the Hazardous Substances Emergency Events Surveillance (HSEES) case definition were reported during calendar year 2002 (preliminary data). Events occurred in 76 counties and the City of St. Louis **(See Figure 12C)**. Two events were threatened releases and two were actual and threatened releases, with the remainder being actual releases. Of all reported events, 51.0% (n=201) occurred at fixed facilities, while 49.0% (n=193) were transportation-related events. Methamphetamine-related activities contributed significantly to the total number of events reported (n=84, 21.3%).

The most common areas involved in fixed-facility events in which only one area was involved include indoor, non-industrial, living (residence) areas (25.9%, n=52), and storage areas above ground (21.9%, n=44). In transportation-related events, 179 (92.7%) occurred during ground transport (e.g., truck, van, or tractor), and 14 (7.3%) involved transport by rail.

Human error was the primary factor in 176 (44.7%) of the events. Illegal activity accounted for 89 (22.6%) events (primarily due to methamphetamine production), and 83 events (21.1%) were the result of equipment failure.

Figure 12C: Distribution of events by county, Hazardous Substances Emergency Events Surveillance, Missouri, 2002.

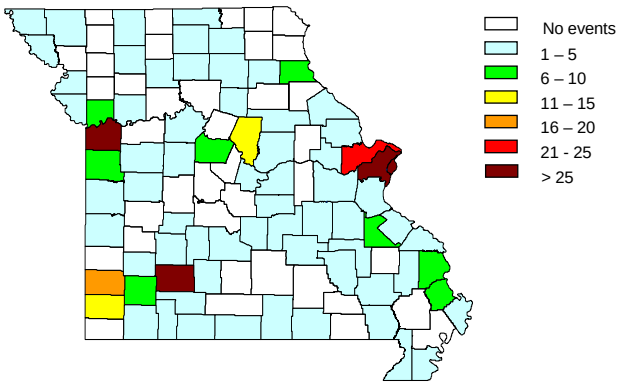


Table 2C: 10 most frequently released substances, Hazardous Substances Emergency Events Surveillance, Missouri, 2002.

Number	Standardized Substance Name	Frequency
1.	Ammonia	77
2.	Hydrochloric Acid	34
3.	Ethyl Ether	23
4.	Paint	17
5.	Solvent NOS *	17
6.	Sulfuric Acid	16
7.	Mercury	15
8.	Sodium Hydroxide	14
9.	Methamphetamine Chemicals NOS*	16
10.	Phosphorus	13
Total		242

* Not Otherwise Specified

CHEMICALS RELEASED

During 2002, 494 substances were released during the 394 HSEES events. Fixed-facility events involved the release of 281 substances, and transportation-related events involved the release of 213 substances.

Of the 16 categories into which HSEES substances were grouped, the categories of substances most commonly released in fixed-facility events were ammonia (22.4%, n=63) and acids (16.7%, n=47). In transportation-related events, chemicals categorized as “other” (17.8%, n=38) and acids (14.6%, n=38) were most frequently released.

The 10 substances most frequently released in Missouri for calendar year 2002 are listed in **Table 2C**.

The substances most frequently released may not necessarily be the most likely to result in victims (**See Table 3C**). For example, paints and dyes were released during 20 events; however, only one of these events resulted in adverse health effects. Conversely, chlorine was released in only five events, and three of these events (60.0%) resulted in adverse health effects, indicating its greater potential for immediate harm. A total of 67 individuals were injured in one event involving the release of chlorine during a transfer operation when a hose ruptured and emergency shut-off measures also failed.

Table 3C: Number of substances released in all events and events with victims, by substance category, Hazardous Substances Emergency Events Surveillance, Missouri, 2002.

Substance Category	No. of Releases	Percentage of total releases	No. of Releases with Victims	Percentage of all releases with victims	Percentage of releases in substance category
Acids	78	15.8	43	19.5	55.1
Ammonia	78	15.8	34	15.5	43.6
Bases	24	4.9	9	4.1	37.5
Chlorine	5	1.0	3	1.4	60.0
Mixtures	17	3.4	3	1.4	17.6
Other inorganic substances	72	14.6	39	17.7	54.2
Other, not otherwise specified	54	10.9	31	14.1	57.4
Paints and dyes	20	4.0	1	0.4	5.0
Pesticides	27	5.5	6	2.7	22.2
Polychlorinated biphenyls	4	0.8	0	0.0	0.0
Volatile organic compounds	82	16.6	40	18.2	48.8
Formulations	3	0.6	3	1.4	100.0
Hetero-organics	3	0.6	0	0.0	0.0
Hydrocarbons	1	0.2	0	0.0	0.0
Oxy-Organics	16	3.2	7	3.2	43.8
Polymers	10	2.0	1	0.4	10.0
Total *	494	99.9	220	100.0	44.5

*Total exceeds number of events because events at which more than one substance was released were counted more than once.

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VICTIMS

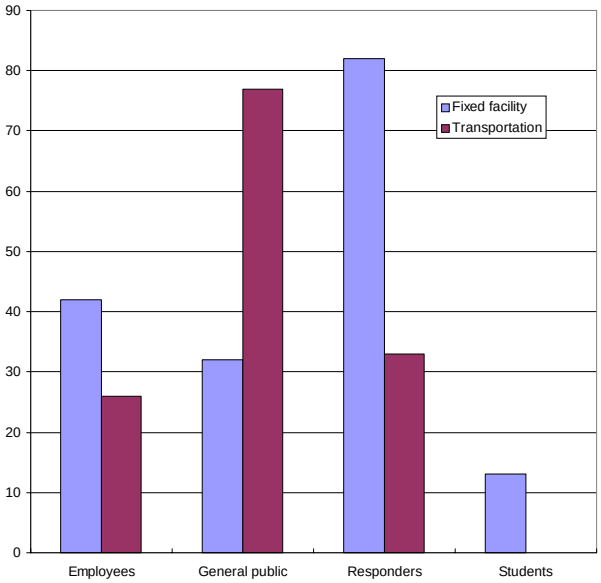
A total of 307 victims were involved in 127 events (32.2% of all events). Of the events with victims, 55.9% (n=71) involved only one victim, and 27.6% (n=35) involved two victims. Seven events (5.5%) involved five or more victims. Of the total number of victims, 171 (55.7%) were injured during fixed-facility events. For transportation events, 136 victims (44.3%) sustained adverse health outcomes.

The population groups most often adversely affected were first responders (27.3%, n=115) and members of the general public (35.5%, n=109). There were 82 first-responder victims in fixed-facility events and 33 first-responder victims in transportation-related events. Of these 115 first responder victims, 94 (81.7%) were police officers injured during methamphetamine-related events **(See Figure 13C)**.

The 307 victims sustained a total of 374 adverse health effects, as some victims had more than one adverse health effect. The most commonly reported adverse health effects were respiratory irritation (45.7%, n=171), headache (19.8%, n=74) and carbon monoxide poisoning (8.8%, n=33). A total of 151 victims (49.2%) were treated at a hospital but were not admitted; 21 (6.8%) were treated at a hospital and admitted. Injuries for 102 victims (33.2%) were reported by an official within 24 hours of the event. The majority of these injuries were self-reported by law enforcement officers responding to and/or collecting evidence from clandestine methamphetamine labs.

Of the five deaths reported in the HSEES system in 2002, four were the result of four separate motor vehicle accidents in which a hazardous substance was released; however, the deaths were due to trauma from the accident. The remaining fatality involved a disabled person who was unable to evacuate from the home during a house fire. The house fire caused several oxygen tanks to explode inside the home, subsequently causing the fatality.

Figure 13C: Distribution of victims by population group* and type of event, Hazardous Substances Emergency Events Surveillance, Missouri, 2002.



* The population group of two victims was not known.

EVACUATIONS

Evacuations were ordered in 32 events (8.1%). The number of persons evacuated was known for 28 of the 32 events. The median number of persons evacuated was 22 (range: 1-400). The length of evacuation was known for 31 of the 32 events. The median length of evacuation was 2.5 hours (range: 0.1-22.5). Six of the 32 evacuations were a result of methamphetamine-related activity. The number of people evacuated was known in five of the six events and ranged from 1 to 30. The total number of people evacuated in these five events was 96. Three of the events involving an evacuation were caused by the theft of anhydrous ammonia, two involved active residential methamphetamine labs, and one involved a mobile methamphetamine lab.

In two events, an official ordered in-place sheltering. During one of these events, an evacuation was also ordered by an official.

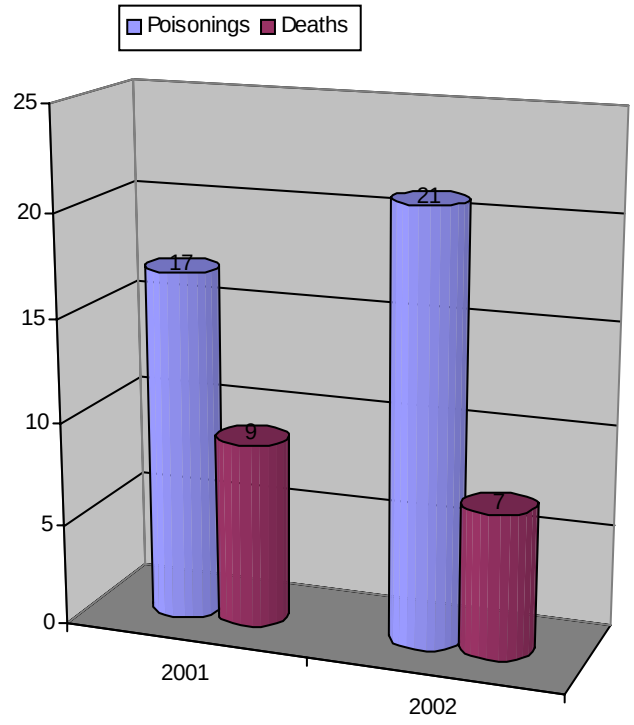
Carbon Monoxide Poisoning

Carbon monoxide is an invisible, odorless, tasteless, highly poisonous gas. The burning of fossil fuels such as gasoline, natural gas, kerosene, charcoal, or wood produce the gas. Inside a home, carbon monoxide can be produced from a natural gas-fueled furnace, water heater, clothes dryer, space heater, or range, as well as a kerosene heater, fireplace, or wood stove.

The early symptoms of carbon monoxide exposure include headaches, dizziness, weakness, sleepiness, nausea, and vomiting; more extreme sequelae include disorientation, coma, convulsions and death.

CDC statistics show that each year, more than 500 Americans die from unintentional carbon monoxide poisoning, and more than 2,000 commit suicide by intentionally poisoning themselves. In Missouri, there were 21 poisoning* cases in 2002, with seven deaths. Physicians and laboratories are required to report cases of carbon monoxide poisoning to their state or local public health agency. However, it is likely many Missouri cases remain unreported **(See Figure 14C)**.

Figure 14C: Missouri Carbon Monoxide Poisonings*, 2001 - 2002



*Case definition: carboxyhemoglobin >15% or death certificate states death due to carbon monoxide poisoning

Hyperthermia and Hypothermia

Hyperthermia

DHSS monitors high temperatures and humidity across the state to prevent heat-related illness and death. The elderly and the chronically ill are more vulnerable to the effects of high temperatures. They perspire less and are more likely to have health problems requiring medications that can impair the body's response to heat. Many prescription medications make individuals more sensitive to the heat. Some of these medications include anti-psychotics, major tranquilizers, antihistamines, over-the-counter sleeping pills, antidepressants, heart drugs and some anti-Parkinsonian agents. Each year many Missourians suffer from heat-related illnesses, and even death. During prolonged periods of high temperatures, air conditioning is the best preventive measure.

During the summer of 2002, there were 24 heat-related deaths in Missouri. All heat-related deaths are confirmed by review of death certificates, ensuring heat or hot environment is a contributing or principal cause. The number of deaths during the summer months has varied over the years in response to the severity and length of the heat spells **(See Figure 15C)**.

Figure 15C: Missouri Hyperthermia Deaths 1980-2002

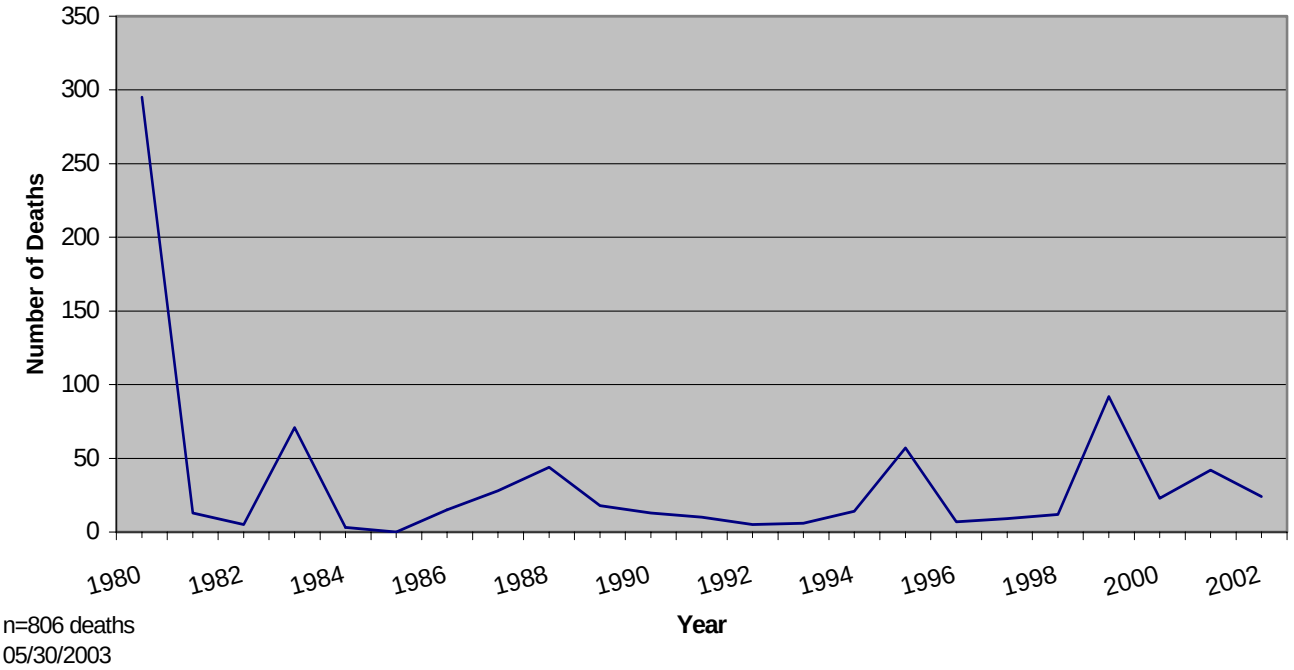
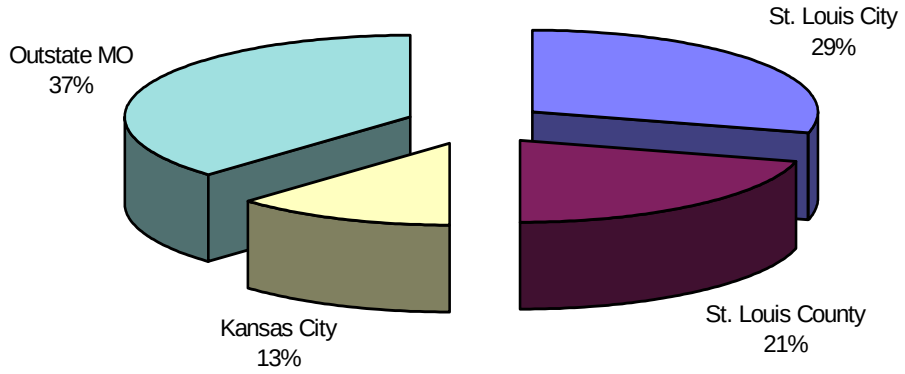


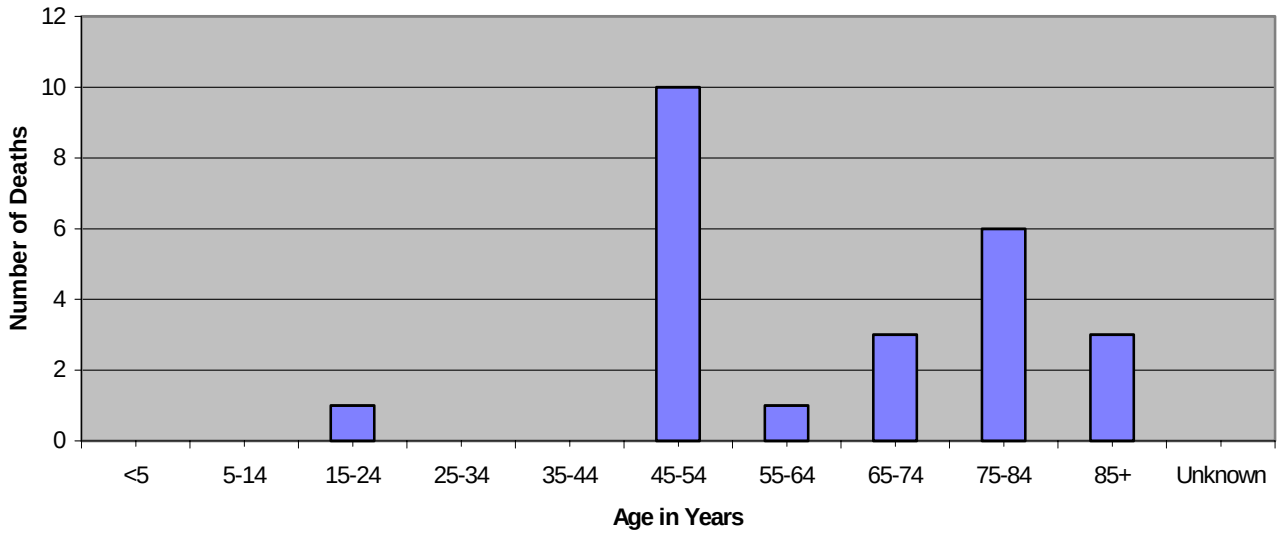
Figure 1

Figure 16C: Heat Related Deaths By Location, Missouri 2002



In 2002, as in previous years, Missouri heat-related deaths were concentrated in urban areas such St. Louis City and Kansas City **(See Figure 16C)**. In the past, the greatest number of deaths have been in populations that are 65 and older, particularly those in the 75-84 age group. However, in 2002, there were more deaths in the 45-54 age group **(See Figure 17C)**.

Figure 17C: Missouri Hyperthermia Deaths by Age Group 2002



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Over the past three years the number of hyperthermia deaths have fluctuated, but white males have consistently been the largest group represented, comprising 52% (n=45) of the deaths **(See Figure 18C and 19C)**. During 1979-1999 (the most recent years for which national data are available), there were 8,015 heat-related deaths in the United States.

DHSS provides public health education on avoiding heat-related illness and death in late spring. Information on heat-related illness is also available through the DHSS Home Page at http://www.dhss.mo.gov/HypoHyperthermia/index.html.

Figure 18C: Hyperthermia Deaths 2000-2002 By Race

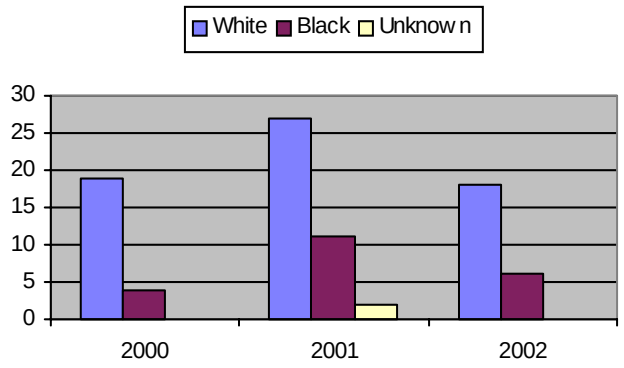
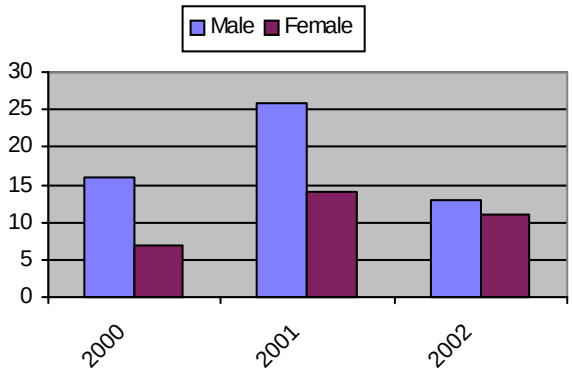


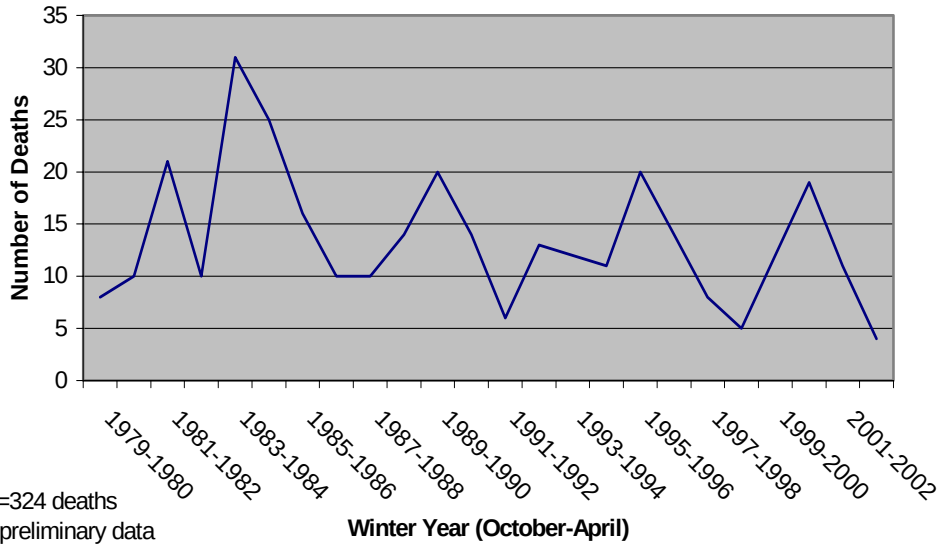
Figure 19C: Hyperthermia Deaths 2000 - 2002 by Gender



Hypothermia

In Missouri, over 334 people have died from the cold during the winter months since 1979. There were 11 deaths during the 2001—2002 cold weather season and four deaths during the 2002—2003 cold weather season, primarily among people over age 50. Hypothermia is defined as a cold injury associated with a fall of body temperature less than 94.1°F and resulting from unintentional exposure to a cold environment **(See Figure 20C)**.

Figure 20C: Missouri Hypothermia Deaths 1979-2003*



n=324 deaths
* preliminary data for 2003

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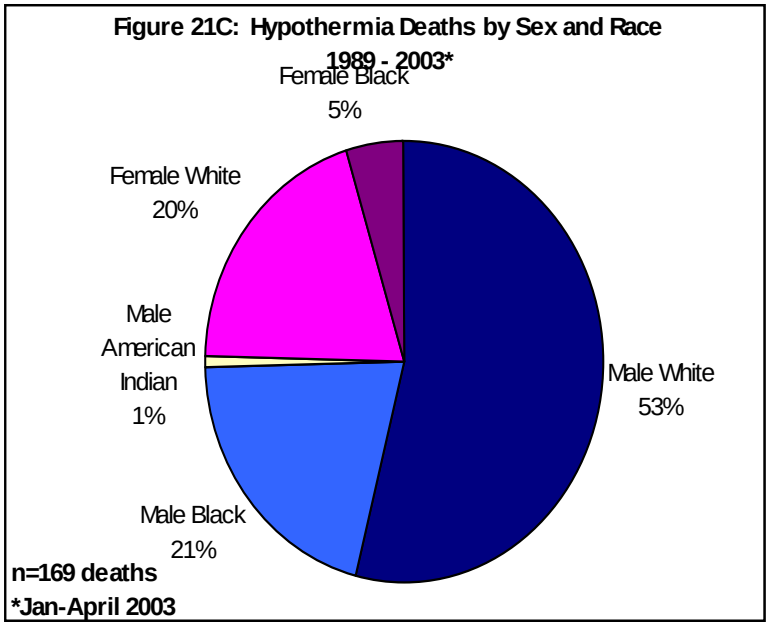
From 1989 through 2003, the largest number of deaths were among white males, comprising 53% (n-91) of the 169 total **(See Figure 21C)**. Common contributing factors in hypothermia deaths are alcohol intoxication and elderly or handicapped individuals who fall outside and are unable to reach shelter or help.



WEBSITE RESOURCES

Missouri Department of Health and Senior Services
http://www.dhss.mo.gov/

Adult and Childhood Lead
National Health and Nutrition Examination Survey
http://www.cdc.gov/nchs/nhanes.htm

National Institute for Occupational Safety and Health
http://www.cdc.gov/niosh/homepage.html

CDC: National Center for Environmental Health
http://www.cdc.gov/nceh/lead/lead.htm

Communicable Disease

Communcable Disease Investigation Reference Manual, Division of Environmental Health and Communicable Disease Prevention, Missouri Department of Health and Senior Services
http://www.dhss.mo.gov/CDManual/CDManual.htm

Council of State and Territorial Epidemiologists
http://www.cste.org/

Foodborne Diseases Active Surveillance Network (FoodNet)
http://www.cdc.gov/foodnet/

CDC: Morbidity and Mortality Weekly Report (MMWR)
http://www.cdc.gov/mmwr/

PULSENET (A program of the Foodborne & Diarrheal Diseases Branch)
http://www.cdc.gov/pulsenet/

Public Health Laboratory Information System (PHLIS)
http://www.cdc.gov/ncidod/dbmd/phlisdata/

World Health Organization
http://www.who.int/en/

HIV/AIDS and Sexually Transmitted Diseases

2002 Epidemiologic Profiles of HIV Disease and STDs in Missouri, Office of Surveillance, Division Of Environmental Health and Communicable Disease Prevention, Missouri Department of Health and Senior Services
http://www.dhss.mo.gov/HIV_STD_AIDS/Data.html

CDC: Sexually Transmitted Diseases Treatment Guidelines 2002
http://www.cdc.gov/std/treatment/default.htm

Front Page

Calculation of Measure of Variation

Example of Central Tendency Calculations:

Data Set being used in this example has the following 11 observed values: 55, 12, 60, 46, 85, 27, 39, 94, 73, 5, 60

Rank the values from least to most: 5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94.

Mean, Median, Mode

Calculate the **mean,** by adding all of the values and dividing the sum by the number of observed values (in this case 11).

5+12+27+39+46+55+60+60+73+85+94=**556**

556/11=**54.55**.

The **mean** is approximately **54.55**.

The **median** is the element that falls in the middle of the ordered set. In this example the **median** is the sixth element in the set, which is **55**.

5, 12, 27, 39, 46, **55**, 60, 60, 73, 85,94

The **mode** is found by locating the value that occurs most frequently. In this example the **mode** value is **60**.

5, 12, 27, 39, 46, 55, **60**, **60**, 73, 85,94

Example of Measures of Variation Calculations:

Range

Data Set being used in this example has the following 11 observed values (ranked least to most):

5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94.

Range is calculated by subtracting the smallest value (**5**) from the largest value (**94**).

94-5=**89**.

The **range** of this set is **89**.

Interquartile Range

The **interquartile range** (**IQR**) is found by subtracting the value that represents the 25th percentile (called the **First Quartile**) from the value that represents the 75th percentile (called the **Third Quartile**).

The **First Quartile** is found by locating the value that is halfway between the minimum value (**5**) and the median (55). Calculate the **First Quartile** by taking the average of the middle two values (**27** and **39**).

5, 12, **27**, **39**, 46, **55**, 60, 60, 73, 85, 94

(27 + 39)/2=**33**

Thus the **First Quartile** is **33**.

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Calculation of Measure of Variation

The **Third Quartile** is similarly calculated by looking at the values from the median (**55**) to the largest value (**94**). Calculate the **Third Quartile**, by taking the average of the middle two values (60 and 73).

5, 12, 27, 39, 46, **55**, 60, **60**, **73**, 85, **94**

(60 + 94)/2=**66.5**

Thus the **Third Quartile** is **66.5**.

Finally we have the terms needed to calculate the **Interquartile Range** (**IQR**). Calculate the **Interquartile Range** by subtracting the **First Quartile** from the **Third Quartile**.

66.5 – **33**=**33.5**

Thus the **IQR** is **33.5**.

Variance and Standard Deviation

Data set being used in this example has the following 11 observed values (ranked least to most): 5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94

Variance is calculated by summing the squares of all of the differences between each observed term and the **mean** (**54.55**).

$(5-54.55)^2 + (12-54.55)^2 + (27-54.55)^2 + (39-54.55)^2$
$+ (55-54.55)^2 + (60-54.55)^2 + (60-54.55)^2 + (73-54.55)^2$
$+ (85-54.55)^2 + (94-54.55)^2 = 804.67$

The **variance** is approximately **804.67**.

Standard deviation is calculated by taking the square root of **variance**. In this example, the square root of variance is the square root of **804.67**.

804.67 =**28.37**

Thus, **standard deviation** of this sample is approximately **28.37**.

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